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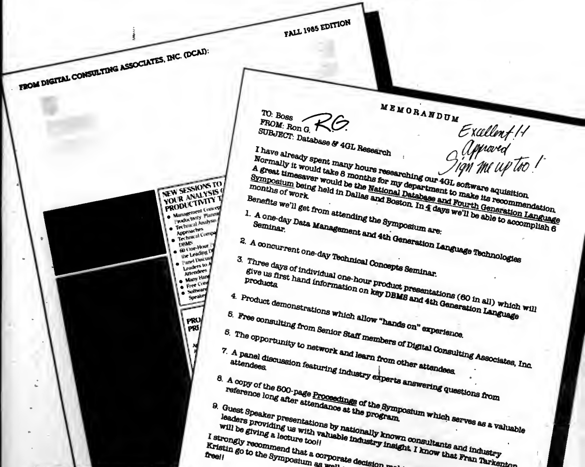
FALL 1985 EDITION
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MEMORANDUM

TO: Boss
FROM: Ron G. R.G.
SUBJECT: Database & 4GL Research

Excellent!!
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I have already spent many hours researching our 4GL software aquisition. Normally it would take 8 months for my department to make its recommendation. A great timesaver would be the National Database and Fourth Generation Language Symposium being held in Dallas and Boston. In 4 days we'll be able to accomplish 6 months of work.

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6. The opportunity to network and learn from other attendees.
7. A panel discussion featuring industry experts answering questions from attendees.
8. A copy of the 500-page Proceedings of the Symposium which serves as a valuable reference long after attendance at the program.
9. Guest Speaker presentations by nationally known consultants and industry leaders providing us with valuable industry insight. I know that Fran Tarkenton will be giving a lecture too!!

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*About our cover: M. Steinert & Sons Co., Inc. graciously allowed us the use of their Boston facilities, and Tuner's Supply Co. of Somerville, Mass., loaned us the piano tools. John Owens took the photo.*

# Editorial

## *Demands and Costs Soar*

The demand to get maximum mileage from the data center's mainframes has never been stronger. This time, however, hardware is not at issue; instead, the issue is the growing cost of systems software.

In the last few years, many data centers have turned to packaged software rather than developing software in house. More often than not, companies found it cheaper and faster to purchase utility software that had been tested, debugged and used successfully by other installations than to develop their own. This may no longer be the case if purchased software costs keep rising.

IBM MVS and VS users have seen their systems software prices more than quadruple since 1980. Estimates indicate that this year IBM 3090 mainframe users will spend about 12.5% of their total three-year major operating costs on systems software. In comparison, the 3033 user in 1980 paid out only 6.5% of his major operating costs for systems software.

The days of "free" systems software are long gone. When software and support charges were no longer included in hardware prices, the potential for cost escalation was introduced; now those charges are rising with a vengeance.

The software market is undeniably important to IBM: Estimated 1984 software revenues for IBM reached $3.2 billion. IBM has begun implementing different marketing and pricing tactics with some of its new products to provide greater pricing flexibility. One of these new tactics involves its new version of Unix. For the first time, IBM will charge a license fee dependent on the extent of the software's usage.

In a move that will stabilize and stimulate the market, IBM is also trying to strengthen its software credibility in its micro-end products. IBM's recently announced partnership with Microsoft to jointly develop future operating systems and systems software products was welcome news to most of the industry. Users and vendors alike were worried IBM would move away from DOS and adopt its own proprietary operating system that would lock systems and applications vendors out of IBM's product line at the same time it locked users in.

The U.S.Commerce Department has projected that the software industry will become a $55 billion market in 1987. This rapid growth will result in larger shares of the MIS budget being spent on systems software.

If it hasn't already, MIS needs to become aware of this escalating cost factor. Double-check your vendor's marketing agreements to make sure you understand all hidden or future costs. And, most of all, be aware that getting the most for your money in systems software is going to get harder.

Ann Dooley

# Insider

## From Data To Intelligence

By Damian Rinaldi

How does one measure the value of data or information? Is it good because it's new? Or is it good because it's accurate? What turns information into intelligence?

An old story relates how a youth searching for meaning and inspiration in his life hears of a great man and leaves his own city to find him. He travels for a dozen years or more, has many wonderful adventures and endures many hardships. But in each place he visits, he hears more of this great teacher who lives in a far-off land and moves on to find him. The young man, grown stronger in body and spirit after all his travels, finally finds himself near his home; he returns, only to discover that the teacher he sought was the old friend living right next door who had sent him on his quest.

Like all good stories, this story has many levels of meaning. But it does illustrate the value of the right intelligence at the right time. The person who finally became the young man's teacher might well have been known to him for all his life. Also, the young man may have been given good information and guidance by the people he encountered, but without the experience of his own efforts behind him, he could not recognize the teacher who lived right under his nose.

A complex challenge confronts those responsible for selecting the right vendors and products for your organizations. You have to develop a flexible strategy for information management and build upon it so that unanticipated requests can be met easily. Information from all parts of your organization must be made available in an appropriate form to people who need the competitive edge intelligence provides.

This challenge has two aspects: technical and organizational hurdles are presented by the partial solutions you have embraced, the hodge-podge of systems and products acquired by individual departments whose requirements you were unable or unwilling to satisfy and the resulting mess you now have responsibility for cleaning up. The problems are compounded by the very simple fact that they are not separable and need to be addressed at the same time they are evolving.

There is, however, a glimmer of reason. The major and most influential, vendors are not quite so insistent that theirs is the *only* acceptable solution and not so intolerant of the coexistence dictated by the flexibility you require. Most encouraging, a growing collection of upstarts have positioned themselves and their products to bridge the gaps between the discrete solutions already in place.

Which piece of information is the right one? Whose advice is best? What strategy is most likely to bring me closer to my goal?

As MIS managers or chief information officers, your obligation is not to provide to your end users the single piece of correct information or intelligence that results in their success or failure. It is your responsibility to provide the tools they need to find their own solutions. Some of those tools exist today. Typical of them are products like Linkware from Linkware Corp., Waltham, Mass. or Framework II from Ashton-Tate, Culver City, Calif. The benefits both products offer are similar, despite their differences in application. Each vendor has recognized that different, incompatible systems are in wide use and that the ability to move information from one strange environment to another creates the opportunity for the end user to turn raw data and unconnected, unrelated information into solid competitive intelligence.

Linkware's universal translation capabilities, as well as the vendor's flexible pricing strategy make it easy for users to experiment and then expand or not depending on their own experience. Framework II's import/export capabilities from industry standard packages and the ability to extend those capabilities as new standards emerge provide the flexibility of response users are and should be demanding.

The integration of user experience and information management technology into knowledge management and expert systems that can result in better intelligence will occur most easily where the barriers against flexibility are broken down.

Access to information and the knowledge that good information is an invaluable asset is spreading like wildfire. Like a wildfire though, it can be guided, and it can make room for new growth. As facilitators or as guides and teachers, information systems managers share the risk that, uncontrolled and unguided, the information management revolution, if not well guided, will burn past and bring down their companies.

■

*Rinaldi is director, software and services information program, International Data Corp. in Framingham, Mass.*

dB
BY RICH TENNANT
EXCUSE ME, SIR, BUT COULD YOU HELP ME WINDOW MY COMPUTER?
SURE, EVELYN. I'M GLAD TO SEE YOU GETTING OVER YOUR HOSTILITY TOWARD THE COMPUTER. IT'S MUCH BETTER TO WORK WITH THE TECHNOLOGY THAN AGAINST IT.
WINDOWING IS A GREAT FUNCTION TOO. IT LETS YOU RUN 2 PROGRAMS AT THE SAME TIME; 2 SPREADSHEETS, OR A FILE AND A GRAPH, OR WHATEVER. NOW, WHAT WOULD YOU LIKE ME TO DO FIRST?
HOLD THE @%!/ WINDOW OPEN.

### Computerworld Focus

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# Manager's Corner

**By Jim Young**

Every time I think about systems software, I am reminded of a particularly applicable cartoon. It showed an automat where, in an attractive surrounding, customers were conveniently removing food from the compartments. On the other side of the device, an army of workers crawled over one another to stock the empty slots, fix the food and keep the equipment going. This may be a humorous and exaggerated criticism of automation, but it speaks truthfully for today's systems software environment and its dependence on people.

For years, operating systems were supposed to be getting more automated, more embedded intelligence, less tailoring, less intervention and better users of the hardware (which would do its part by increased use of microcode). And, in fact, much of this happened. Unfortunately, however, it did not result in a simple, people-free environment. Simultaneously, function and complexity have increased dramatically. Broader integration has become more necessary; performance has become more critical. People are still required — many more people than have been saved by selected improvements. The result is a situation with accelerated demands on the systems programmers and the telecommunications, software and data base analysts. As computer systems play a greater role in company operations, these people become increasingly important. To quote the sports writers, they are the "straw that stirs the drink." Creating a productive environment for these people is of paramount importance to today's data processing manager.

Technical decisions are not unimportant. Selection of operating system, utilities, performance tools, spooling packages, library management tools and so on is still an integral part of today's DP environment and can still have fatal repercussions. Fitting these selections into a long-term strategy, ensuring compatibility between various packages and controlling costs all can lead to many an ulcer or sleepless night. Nevertheless, the most critical factor for success in this environment is the people who maintain these products.

I am also not emphasizing systems software people management and ignoring other DP professionals. It's just that most traditional organizations have come to understand the role played by computer operations, applications development and other people whose jobs can be directly related to products delivered to today's perceptive users. However, the role played by people managing systems software is still obscure. The old perception as backroom specialists dealing with arcane toys or as ugly ducklings intrigued by obscure technology still exists. You can almost see the thick glasses and white lab coats. The image may have some historic justification, but it cannot be allowed to continue without jeopardizing the foundation on which today's applications rest and placing at risk company operations and future performance.

To allow systems software professionals to make strong contributions, a productive, supportive environment can be created in the following areas:

- **Salary:** While the laws of supply and demand more than correct any discrepancies in starting pay, it is a sin for people to have to change jobs continually to be fairly compensated. By permitting this situation to continue, companies are needlessly losing critical skills as well as proprietary knowledge. DP managers must ensure salary structures that allow improvements within an organization. Job hopping has somewhat abated, but an absence of good internal programs could cause it to become an epidemic again at the first rays of economic sunshine. These salary scales even today can be easily justified by the criticality of system software in company operations.
- **Careers:** Salary programs should be accompanied by a plan of upward mobility — additional job positions to reflect increasing responsibilities. Just offering more money for similar performance is treating systems software professionals as mercenaries, an attitude that breeds the fickle loyalty of all soldiers of fortune. True careers allow on-the-job training, which expands responsibilities and allows systems software people to improve and broaden their skills. Simultaneously, they will be increasing their contribution to an environment for which they will build a sense of ownership. A happy consequence is that as systems software environments evolve, the transitions are consistently controlled by these long-term employees.
- **Development:** To complement this upward mobility, skill development programs will be necessary to prepare people for the new jobs. Increased requirements for people skills, planning skills, budget management skills and so on are essential to eliminate the old stigma of technical mechanic and to integrate system software methods into the rhythm of the management process. These skills are more critical than ever in today's environment with long lead times, more complex far-reaching impacts and more intricate coordination for systems software.
- **Recognition:** Although positive recognition of the systems software staff is an essential first step, educating others is also necessary. Today's DP managers have almost exhausted their ability to flatter, cajole and motivate. Technical professionals know their role transcends internal DP issues and they are becoming insensitive to traditional blandishments. Others must also join in to emphasize the broad dependence on this technology. This includes key user managers, human resource management and, ultimately, company executives.
- **Involvement:** As job responsibilities and job skills expand, systems software professionals will be able to get involved as equal partners, not servants, on major company plans and programs. This is the level where all the previous groundwork pays off by having adequately rewarded, motivated, trained professionals that have developed their skills over a period of years and now understand both technical capabilities and the company's climate and ultimate direction. People with the right technical background and business perspective will appreciate the importance of the critical decisions made by DP. With their participation, those decisions can assure the right foundation for future growth and productivity. Ongoing implementation then becomes a natural extension of the process, a commitment and not a management mandate.

Maybe a company's heavy dependence on people with specialized skills to manage the technical environment will disappear eventually. Maybe technology will absorb their responsibilities or restructuring will spread out the dependence on systems software. Maybe. But in the meantime, a weak systems software staff is the sword of Damocles hanging over an unsuspecting company's future.

The job of today's manager is to prevent this danger by improving the environment of systems software professionals and turning them into a company strength.

◆

*Young is management information systems director and responsible for user technology at Wright Line, Inc., Worcester, Mass. He has worked in the industry for 15 years.*

# Q&A

*Burt Rubinstein is vice-president of Research and Technology at Index Technology Corp. in Cambridge, Mass. He helped to develop Excelerator, an integrated workbench of tools for systems analysts and designers. Rubenstein shared with* Computerworld Focus *his views on how workbench tools have changed and will continue to change the way traditional data processing professionals support companies' business needs.*

***What systems development problems do workbench tools target?***

Five or 10 years ago all the tools were programmers' tools — like compilers, editors and debuggers — even though the research at the time was really saying a lot of the payback could be improved if people did a better job up front. In the old days, it was 20% analysis and design, 80% code and debug. Realistically, now it is probably 40% analysis and design and 60% code and debug.

***Did the percentage change because it had to change or because with new technology it could change?***

A combination of the two. People were becoming more sophisticated. There was five to 10 times more work to do and more complex systems needed to be built, but there were only 10% to 20% more people. They were ripe for new techniques. But the new techniques were burdensome. People had to become much more formal in the way they did analysis and design. Because of that, the whole area of tools really opened up maybe three or four years ago.

***Can you define these workbench tools?***

There is a classical waterfall life cycle where you finish one step, have everything signed off by the user and you go on to the next step. An ideal workbench would be sitting down with the computer and talking to it about your requirements; then out the other end would come a system all fully coded and complete with user documentation. Obviously we're nowhere near that goal yet. Workbench products are attacking the front end with the intention of attacking more over time — how do you look at an existing real world system? How do you decide what is in it, and then how do you design a first cut at what the computer system is going to do with it? How do you integrate all that together? Over time, one would hope these workbenches would go more toward the real front end of feasibility and business needs and toward the far end of making a good strong link to the actual coding and debugging of the system.

***Are you talking about a fifth generation beginning at the front end?***

When the workbench tools really meet their potential, yes. When you do the whole thing it might be even beyond the fifth generation. Over time, the different categories of people building systems, like analysts and programmer/analysts and programmers and maintenance coders and systems programmers will really become two: the analyst/builder, who might actually be the user; and, at the other end, the people who provide the tools the analyst/builder uses. Hopefully, the number of tools providers will shrink so that all you have are analysts/builders who are actually the end users.

***Will these products alter the makeup of the DP department?***

Workbench products combined with techniques, methodologies and concepts of system design will. Good programmer/analysts who can work with users will become the analyst/builders, and really good systems programmers will become the tool providers. We hope to provide at least five or 10 times productivity improvements for the development life cycle. It has to drastically change the makeup of the DP organization.

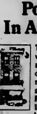
***Will people within the DP organization have an easy time adapting to these changes?***

I don't want to sound elitist, but the

*(Continued on Page 9)*

# In the News

## Reports Cite Potential In Aftermarts



The microcomputer software industry might not be as bleak as the press makes out, according to separate reports issued by market research firms International Resource Development, Inc. (IRD) of Norwalk, Conn., and Venture Development Corp. (VDC) of Natick, Mass.

According to the IRD report, "Key Vertical Markets for Microcomputer Software — Financial, Legal and Real Estate Segments," the real profits in microcomputer software lie in the software aftermarket, which it defined as training, consulting, software enhancements and support and business forms and supplies. The report indicated that aftermarket sales are now shooting past initial software package sales revenues and by 1995 will account for fully 84% of total microcomputer software industry sales.

The report also noted that the number of small firms is rapidly shrinking in some industries such as banking, drying up a primary market for smaller software firms. Ironically, though the aftermarket is booming, many software vendors are ignoring the market, concentrating on initial sales. This is a strategy, the report pointed out, dangerous to these firms in the long term.

Both the IRD report and the VDC report entitled "Distribution of Microcomputers to OEMs and VARs: A Strategic Analysis," emphasized the strength of the microcomputer vertical software market.

"Whereas horizontal application packages automate specific tasks such as accounts receivable or inventory control," the VDC report stated, "vertical applications software can automate an entire small business." The report also predicted that vertical market micro software sales in the U.S. will reach nearly $2 billion by 1986.

Among the businesses the VDC report said would offer excellent growth opportunities for vertical software over the next five years were medical and dental practices, pharmacies, legal practices, contracting and construction firms, insurance agencies and wholesale/retail distribution. Vertical markets already represent, the VDC report noted, as much as 50% of the entire microcomputer marketplace.

For further information, contact International Resource Development, Inc., 6 Prowitt St., Norwalk, Conn. 06855 or Venture Development Corp., One Apple Hill, P.O. Box 9000, Natick, Mass. 01760-9904.

## Ashton-Tate Stakes Claim To Multimate

The planned takeover of Multimate International Corp., East Hartford, Conn., by Ashton-Tate of Culver City, Calif., might provide Ashton-Tate with the extra guns it needs to become Number One in the beleaguered U.S. microcomputer software market.

First, the purchase of Multimate International will give Ashton-Tate combined revenues of over $100 million for fiscal 1985, second only to the $157 million in revenues registered by Lotus Development Corp. of Cambridge, Mass. It will also provide Ashton-Tate with another software product winner in Multimate, the successful word processing package, which Multimate International claims has captured from 30% to 35% of the U.S. market for WP software within corporate micro installations.

Multimate, in combination with Ashton-Tate's very successful Dbase III data base management system and its Framework integrated software package, give Ashton-Tate a strong triad of products going into the latter part of the decade. Multimates's solid Fortune 1000 customer base will also give Ashton-Tate a greater avenue into large corporations.

"What we are seeing is a further consolidation of software companies in the U.S. micro software market," explained George Colony, president of Forrester Research Inc., a Cambridge, Mass., market research firm. "Ashton-Tate is adding a strong WP package to its products, trying to preempt a move by Lotus (Development Corp.) into that same area."

Colony said he views the Ashton-Tate/Multimate acquisition as part of the final phase of what he termed the "closing-off" of the first-generation micro software marketplace. In Colony's estimate, the first-generation market, represented by the IBM Personal Computer, has been won by a few large software houses represented by Lotus (which recently purchased Software Arts, Inc. of Wellesley, Mass.), Ashton-Tate, Software Publishing Corp. of Mountain View, Calif., and Microsoft Corp. of Bellevue, Wash. According to Colony there is now little hope for new, innovative software companies to enter and survive in this market.

Where Colony did see hope, however, was in the budding second-generation micro market represented by the IBM AT,

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## MANAGEMENT SUMMARY

FDR (formally known as Fast Dump Restore) is a dump and restore utility designed to reduce the time required to produce a dump and restore the data. FDR replaces all standard IBM dump/restore utilities, supports all VS1 and MVS(XA) environments, and can be used with most IBM and compatible disk devices.

FDR uses three method plans in attaining input/output efficiency: 1) the use of increased blocking factors, 2) the elimination of redundant and unnecessary data, and 3) the use of cylinder orientation to minimize delays due to physical rotation, arm movement, and so on. FDR also offers a performance option (BUFNO=MAX) that increases the number of buffers FDR uses during the dump operation, and is designed to decrease elapsed time and save system resources. FDR has a full-volume disk-to-disk feature.

FDR includes a *Stand-Alone Restore* (SAR) program. This program allows restoration of a full-disk volume when, due to the unavailability of a VS1 or MVS operating system, FDR cannot be run. SAR can also be used to restore partial volumes and to clip a volume. SAR also aids the operator by issuing prompting messages on the console and error messages on the console, printer or tape whenever a problem is encountered during the restore. SAR also permits the Restore of specific tracks.

Recent enhancements to SAR include support of standalone operations in MVS/XA mode, a standalone backup capability, and support of backup and restore functions under VM.

A no-charge option available to FDR users is the *Data Set Functions* (DSF) subsystem. DSF allows the user to dump and restore individual data sets on a pack and to dump and restore by absolute tracks. It can also be used to restore data sets from full-volume FDR backup tapes and allows the user to rename a data set when restoring it. Password protection is provided, and can be activated on either a volume or data set basis.

*Compaktor* (CPK), an extra-cost option, is a disk management utility used to reorganize direct-access volumes using the FDR methodology. It reduces space fragmentation, merges data set extents, aids in positioning data sets, and offers several other solutions to frequent disk pack organization problems.

*Automatic Backup and Recovery* (ABR) is another extra-cost option that manages disk space on direct-access volumes. Disk volume and data set backup can be automated based on the last reference date and update characteristics. Data sets that have not been used for a time period can be automatically archived, freeing the disk space for more productive use. Reports can be tailored to user specifications. A Data Set Not Found Exit permits the Automatic Restore of data sets that have been archived without user intervention. The vendor recently released extensive ABR panels for TSO users. The panels provide complete dataset and volume reporting, thus permitting and users more direct control over their datasets. ABR is designed to operate with both the DSF and Compaktor subsystems.

FDR provides enhanced support for VSAM files which are cataloged into an ICF catalog. These data sets are also relocatable with DSF and ABR.

## COMPETITIVE POSITION

While the packages listed on page one of this report compete with the FDR/Compaktor/ABR products, the only competition for FDR itself is IBM's DF/DSS. FDR is more efficient than the IBM product. This, along with its reliability, account for FDR's very extensive user base.

The other products listed as competition are disk space management packages and thus compete with ABR. The main competition includes Cambridge's ASM2 and Sterling's DMS/OS. While both of these products were introduced several years before ABR, neither has as large a user base. In addition, they are both more expensive than ABR.

The FDR/Compaktor/ABR family of products holds a very strong market position that is likely to continue. The family provides outstanding performance and reliability, and the vendor has earned a reputation for quality control that is equalled by few in the industry.

## ADVANTAGES AND RESTRICTIONS

FDR, as its name implies, is a fast method for dumping and restoring data. The package is faster and more efficient than similar IBM utilities, and achieves a high performance level, reducing elapsed time and saving system resources.

A major advantage is the Stand-Alone Restore program. The ability to backup and restore disk volumes without an available operating system is critical to disaster recovery. The automatic restore to unlike devices and the automatic restore of archived files are additional advantages.

Another major advantage is the outstanding reliability of both the product and the vendor, as attested to by the rating in Table 1 and the wealth of comments from users. Many consider FDR the most reliable software package they have ever used, with never a bug to be found. Another decided advantage of FDR is the free 90-day trial offering.

## USER REACTION

Twenty-three users of FDR responded to an independent Datapro survey. The average age of installation was 4½ years. The utility was running on various IBM mainframes as well as on an Amdahl 5860 and three NAS models. All but one were running under MVS, MVS/SP, or MVS/XA. Not every respondent rated all categories. Six did not rate User education, explaining that none is available.

| TABLE 1. | Excel. | Good | Fair | Poor | MAUR* | CA** |
|---|---|---|---|---|---|---|
| Reliability | 23 | 0 | 0 | 0 | 4.00 | 1 |
| Efficiency | 19 | 4 | 0 | 0 | 3.83 | 1 |
| Ease of installation | 20 | 3 | 0 | 0 | 3.87 | 1 |
| Ease of use | 12 | 10 | 1 | 0 | 3.48 | 1 |
| Troubleshooting | 19 | 3 | 0 | 0 | 3.86 | 1 |
| Documentation | 10 | 9 | 3 | 1 | 3.22 | 1 |
| User education | 3 | 4 | 6 | 2 | 2.71 | 2 |
| Vendor's maintenance | 14 | 7 | 0 | 0 | 3.67 | 1 |
| Overall satisfaction | 17 | 5 | 0 | 0 | 3.77 | 1 |

*Mean Average User Rating, on a scale of 4.0 for Excellent.
**Cluster Analysis—the range of average user ratings attributed to each cluster for each category, where Cluster 1 is the highest and Cluster 4 is the lowest. (See Report [illegible] for individual category Cluster allocations.)

These users overwhelmingly stressed the advantages of FDR. All 23 said the package performed as promised by the vendor. Many comments were made regarding the outstanding reliability of the package, with long-time users saying that they have never had any problem with FDR. They consider IDP the most reliable software firm they have ever dealt with, with one commenting: "I wish some of the big name software folks took some lessons in quality assurance from Innovation." This is also reflected in the table above, with reliability receiving a very rare 4.00 rating.

Twenty users said FDR saves system resources, 18 said it saves staff time, 12 considered it inexpensive, and 16 said that using FDR resulted in financial savings for their companies. Fourteen considered the package simple to operate and 10 said it is flexible in its capabilities, allowing different device migration, archiving, single dataset restore, and global functionality.

Several users praised the vendor for providing excellent technical support. IDP is very responsive to problems or questions and the support staff is very well trained with thorough knowledge of the internals of FDR and MVS. In addition, IDP is quick to upgrade their product as soon as IBM announces any new hardware or system modifications. Furthermore, the vendor is continually improving and enhancing their products' capabilities.

Few restrictions were mentioned. Two users considered FDR complex and one said it is inflexible, while another said that the migration facility for data set movement to unlike devices is slow. One user said the documentation is poorly organized, while the user who rated documentation poor commented that there is no overall description of how all the components of the package fit together. As a result of this, much time is spent flipping through the manual to determine what is needed to carry out a requested function. A vendor spokesman explained that reorganization of the documentation is difficult because some users have only one component of the product. While there are no major plans for changing the documentation, the vendor is currently adding more examples of how to use the product. ☐

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# In the News

IBM AT compatibles, "the PC2 when it arrives" and all the Intel Corp. 80286 processor-based systems now appearing and offering multitasking, multiprocessing and windowing capabilities.

"There are great opportunities opening for networkable software and multitasking applications," Colony explained. "The 80286 is creating a whole new second-generation market for software entrepreneurs which the major players in the IBM PC market will not be able to get into [in force] for awhile. They have simply too much money and development tied to the old [IBM] PC market."

Neither Lotus nor Microsoft would comment on the Ashton-Tate/Multimate merger.

## Software For Micros Now MIS Turf

If there were any doubts about management information systems (MIS) in large U.S. corporations taking in the reins of microcomputer software purchasing from end users, studies such as the one recently conducted by the Omni Group in New York, N.Y., set the record straight.

According to Milburn Smith, senior consultant with the Omni Group, decision-makers representing 304 of the top 4,000 U.S. manufacturing and service companies were asked if they had put in place approved purchasing lists for microcomputer software. Of those companies interviewed, 44% said they had put such lists in place and were enforcing them. Of those companies with lists already in place, fully 76% listed MIS as the most influential group in putting the approved purchasing lists together, 8% had office automation committees handle the lists, 6% used administrative services departments and a mere 4% had user departments draw up their own purchasing lists. "This study indicates," explained Smith, "that users play a much larger role in purchasing micro software in smaller companies."

A second study by the Omni Group asked these decision-makers which micro applications software fell short of fulfilling their goals. Smith said 51% of the respondents chose micro-to-mainframe software as the most disappointing, primarily due to the complexities and crudeness of data conversion and formatting. Another 11% had an axe to grind with data base management systems, 10% had it in for software communications with outside data bases, 8% took issue with word processing packages, and 3% said electronic spreadsheets still had a way to go. Only 18% had no complaints.

For further information, contact the Omni Group at 115 E. 57th St., New York, N.Y. 10022.

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**informatics general corporation.**

**application development report: MARK SERIES**

FOURTH GENERATION PROGRAMMING TOOLS MOVE JOBS THROUGH PIPELINE QUICKER AT WASHINGTON NATURAL GAS

John Rowlands, Manager of Data Processing Applications at Washington Natural Gas Company in Seattle, feels that too many managers in data processing are waiting for future programming tools rather than making use of the excellent application generators already available.

"At Washington Natural, rather than waiting for predictions about fantastic future software tools to come true, we decided to realize the potential provided by fourth-generation productivity aids available now."

The tools chosen by Washington Natural were MARK IV® and MARK V®, Application Development Systems from Informatics General Corporation for generating batch and online applications, respectively.

When Washington Natural, the largest distributor of energy in Washington, wanted a new general ledger system, "We looked at a half-dozen different products, including packaged systems," Rowlands explains. "We then proposed to senior management that instead of buying a package we should buy MARK IV and develop a general ledger system in-house. We said we could do it with half the people, in half the time, using MARK IV rather than COBOL.

"Management said to go ahead, and we started training the information systems staff," Rowlands continues. "We had two programmers, together with a consultant from Informatics, working on the general ledger system — and during the next two months, I became quite concerned. They weren't doing anything the way a COBOL programmer/analyst would.

"They were designing output when a COBOL programmer would be flowcharting, and they were designing input when a regular programmer would be coding. They were designing processes when a regular programmer would still be coding. They started coding when a COBOL programmer would be recoding.

"Then came the big surprise," Rowlands adds. "They started printing reports when a COBOL programmer would be printing core dumps! The whole system worked, and they never had a single core dump. And management was shocked, because we came in on time, within budget."

Washington Natural Gas has also developed a personnel and payroll system, a sales prospect system, several resource management systems, and a contractor management system. Rowlands points out that these systems all utilize the very powerful file maintenance functions of MARK IV.

Of all the programs now in production at Washington Natural Gas, 44% are written in MARK IV. "We've trained most of our programming staff on MARK IV, and we recommend its use for new batch application development wherever possible," Rowlands says. "I feel that MARK IV significantly improves productivity. Our programmers tell me that it can cut development time by 60-90%.

"I also like the fact that MARK IV forces structure," he adds. "People with very little MARK IV training can easily follow the logic of complicated MARK IV programs. I've also found that MARK IV can be taught to non-data processing people — and it improves morale because programmers can finish a job and get on to the next one more quickly.

"MARK IV gives us the ability to preview, create, and change reports very quickly. It also improves testing. Creating test files and testing systems is done automatically — and because of this, programmers tend to really test their systems."

ONLINE APPLICATION DEVELOPMENT

In 1984, to meet a burgeoning demand for new online systems, Washington Natural Gas purchased MARK V for online application development in its CICS environment. The company uses an IBM 4381 mainframe running the DOS VSE/VM operating system. Their online network includes approximately 200 terminals, scattered throughout seven offices and three warehouses.

"I felt that online systems development should be done using nonprocedural languages," Rowlands explains, "and our success with MARK IV gave me a good deal of confidence in Informatics. Furthermore, MARK V is similar in many ways to MARK IV, and I felt that this should enhance the learning curve and acceptance of the product by our programmers.

"I particularly like the way MARK V allows you to easily prototype new systems — so that users can approve parts of the system as you develop it," Rowlands says.

"The prototyping we can do with MARK V lets us sit down with users at a terminal and show them exactly how a screen will look and how one screen flows into the next. And we can immediately change things they don't like. It's really joint development, done with the users in real time."

Rowlands cautions that adequate mainframe memory size is a "must" when using development tools like MARK V. However, he notes that "on a transaction-by-transaction basis, MARK V compares favorably with COBOL in its memory requirements.

"We are planning a conversion from DOS to MVS in the near future," he adds, "and I chuckle to myself every time I think how easy our conversion is going to be, compared to shops that are primarily oriented to COBOL and assembler programming

"As a manager, I'm pleased with the way MARK IV and MARK V are improving our programmer productivity and raising department morale," Rowlands concluded.

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## Data Transfer Hot Topic For NUA

Two growing areas of electronic data transfer are being addressed by the Network Users Association (NUA) of Alexandria, Va. NUA subcommittees are being established to deal with the separate issues of electronic data interchange (EDI) and electronic document exchange (EDE). NUA distinguishes between the two by saying that with electronic data interchange, users take and use the transferred information as is. With electronic document exchange, users intend to revise the transferred documents and place them into their own information systems for their own use.

Marvin Rahm, telecommunications consultant with Dow Chemical Co., Midland, Mich., and chairman of several of the NUA subcommittees, said a number of large U.S. companies are demanding true electronic data interchange, whereby invoices, purchase orders, inventory and other information is made available by vendors for customers.

"At Dow Chemical, we have pilot projects under way to exchange electronic purchase order, accounts payable and receivable information with General Motors Corp. and some of our other large customers and clients," Rahm said.

Rahm added that he hoped these pilot projects would reach the operations stage in three or four years. The company would first have to iron out several problems with the complex coding of the accounting systems. At the end of this period, however, Rahm expects the interchange operations to be "completely paperless," he said.

The big problem for Dow Chemical and other companies working on EDI is data security, an issue being addressed by an NUA subcommittee.

With electronic document exchange, the NUA is focusing on the issue of such standards as IBM's document interchange architecture (DIA), IBM's document content architecture (DCA) and its distributed office support system (Disoss).

"It's important to establish standards when you're dealing with voice, data, text, image and graphics," Rahm explained. "Users have to be able to utilise combinations of these, but without com-

# In the News

patibility, document exchange between equipment and systems from different manufacturers isn't guaranteed."

Joseph V. St. Amand, senior network architecture consultant at Wang Laboratories, Inc., Lowell, Mass., and also a member of some NUA subcommittees, said the problem for users is not data interchange as much as it is the gateways that connect the IBM Systems Network Architecture (SNA) mail systems. Amand explained that users are looking for a common definition or set of protocols for electronic data interchange that will provide an international foundation for store-and-forward messaging systems.

"On the bright side," Amand said, "a number of vendors who belong to the Computer Communications Industry Association have been meeting together and considering funding the joint development of the [International Organization for Standardization] Open Systems Architecture to IBM's Systems Network Architecture."

## Q&A

*(Continued from Page 5)*

good people will. The good people were the first to hop into structured programming and structured design and the first to look at formal analysis techniques. The good people can work with the user and get the requirements out in a very succinct form. On the other hand, the average or below-average programmers who are just translating what has already been done will fall out or become enlightened.

***Do you see this in an information center context?***

Very much so. The concepts of understanding what the requirements are and being able to specify those interactively to a system are the same in a development center or information center. There seems to be a convergence on ideas bottom up from the development center and top down from the information center.

***Are workbench tools revolutionary products?***

A little bit of revolution and a lot of evolution. If we had the perfect solution right now, it would probably take five years until everybody embraced it. But it will grow in three areas: the breadth of what it does, the depth to which it goes and, finally, integration.

***Will project time be shortened?***

Project time can vary from one or two months for a very simple system to more than three years. After three years a project might be canceled because the needs changed before the system could be delivered. Workbench tools not only produce the systems more efficiently but more effectively in that they'll allow a system to be built that will actually have a very high chance of meeting the needs much more quickly. And as these tools develop, more users will be able to build the systems themselves. The users will become more systems-oriented, systems people will become more user-oriented and everybody will become less computer-oriented.

*— Lee White*

## System/36 To Run Pick?

IBM watchers make a living predicting what the computer giant will do next. Some speculation now has IBM adopting the Pick operating system from Pick Systems, Inc., Irvine, Calif., for their System/36 computers. Rich Lauer, vice-president of marketing for Pick Systems, added fuel to the fire by stating that "we are waiting for a firm commitment from IBM on the System/36."

The fact that IBM might have Pick on its System/36s is not earth-shattering; Pick already runs on all IBM mainframes using the IBM VM operating system as well as the Series/1, the IBM PC, the IBM XT, and, scheduled for this October, the IBM AT. What would make porting the Pick operating system to the System/36 unique, however, would be the necessity of IBM exposing to Pick Systems the microcode and other proprietary features of what until now has been a very closed machine.

"Other IBM computers are not nearly so proprietary," Lauer explained. "IBM's microcomputer line was made purposefully open for vendors to produce add-ons. Same with the Series/1. The IBM 4300 series and the 30 series are not as proprietary because the VM operating system allows access to certain machine information. The System/36, however, has always been a closely-controlled architecture."

Frank Petyak, Pick Systems national sales manager, has stated that Pick Systems has been under pressure for some time to make their operating system compatible on the System/36.

"Even if IBM balks," Lauer said, "it's hardly the end of the world for Pick Systems. We have over 40,000 Pick installation sites around the world, and we've just delivered the latest version of Pick to the English market. It won't be a great disappointment."

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# DBMS Systems: How Will The Newcomers Fare?

[illegible]

By [illegible]

Data-base management systems (DBMS) are no longer entirely in the hands of programmers and data processing centers, but are beginning to appear as tools of middle management. A big catalyst for this change is the raft of fourth-generation languages that have appeared in the marketplace, trailing a string of development tools in their wake.

On the input side, these software tools give a user the means to create data dictionaries, to model data bases and even to analyze data bases. On the output side, [illegible] creators can create [illegible] of customized query and [illegible] programs and decision support aids ranging from spreadsheets to multidimensional data analysis, goal-seeking and expert systems.

One such product is Sperry Corp.'s Mapper fourth-generation language, currently in its thirty-first enhancement and long part of this self-help movement toward end users. Sperry managers have themselves used the system for some time, sitting at their Sperry Personal Computers or terminals and creating their own data base [illegible]

[illegible] Bibley [illegible] of [illegible] plained that "Mapper [illegible] oped for users by users, [illegible] understand what they need." Using the Mapper [illegible] a set of application tools, [illegible] Mapper [illegible] tor instruction package, [illegible] employees can be up and [illegible] customized data base programs [illegible] four hours, Smythe claimed. [illegible] fact, Sperry thinks Mapper is good enough to franchise. Smythe has been assigned to sell service bureau franchises that will offer the

[illegible] 1100 [illegible] of North [illegible] Super [illegible] claims is a [illegible] ever [illegible] Nat[illegible] programmers," [illegible] ral product [illegible] AG, said. [illegible] but a [illegible] delivers a subset of Natural into the hands of IBM PC users." Riegal added that Super Natural can also be linked to micros.

The Waltham/Weston Hospital, located in Waltham, Mass., is a Natural user. In 1983, Don Cotton, the hospital's director of MIS, began looking for a DBMS and easy-to-use programming language to create a replacement for what he termed the hospital's inadequate Report Program Generator (RPG) system running on an IBM System/3. The MIS plan called for heavy user demand, according to Cotton, who was surprised to discover that many of the hospital's personnel, especially the nurses, expressed an interest in using the system to track patients' medical data and generate patient reports.

Software AG's Natural and Adabas (an acronym for A Data Base), were chosen primarily for their easy software maintenance, Cotton said. Various DBMS applications such as patient billing and medical history were soon produced. Though the applications were written by professionals in the MIS department, Cotton pointed out, input was culled from the eventual users about what they personally wished from the system. This information played an important roll in how the various DBMS were structured. Over 90 nurses are now on-line to the system, which resides in an IBM 4300 series mainframe, with plans that eventually include the 150 staff doctors.

Using Super Natural, a menu-driven, data base query system, nurses view updated patient files. They can then combine data from these files with data from other files and produce individual reports. Users communicate with the system through English-like commands and icons, Cotton said.

He added that the system's fourth-generation language tools make it easy for nurses and other staff members to develop their own programs.

Most fourth-generation software tools provide nonprocedural, display-driven interfaces to create and update a personal data base. Nonprocedural is one of those terms carrying just about everything but an easy definition. The definition given by Doug Mahugh, however, a Chicago-based writer and programmer, is a little more eloquent than most: "A nonprocedural language is a programming language that allows the programmer to state goals to be achieved, rather than the specific procedures necessary to accomplish them." In contrast, Mahugh said, third-generation languages such as C and Fortran allow the programmer to specify how the program will run, as well as what it will do.

Fourth-generation languages make it easier for end users to program in English-like statements. So-called English-like statements range from languages sounding like stilted English, to something more like machine code. Generally, the best of natural language interfaces use English-like statements that resemble everyday conversational English. Through such statements, fourth-generation languages are giving nontechnical users the ability to program and access their programs without abandoning their native tongue.

Oracle, a fourth-generation language produced by Oracle Corp., Menlo Park, Calif., is an example of the changing user interface. Oracle is based on IBM's Structured Query Language (SQL), a fourth-generation relational data base language. Oracle currently provides three levels of interfaces catering to the expertise (or lack of it) of Oracle users. One level, called Easy, features several Macintosh-like interfaces, such as a mouse and pop-up menus. The emphasis with Easy is on the use of icons to create simple data base query and report applications. A higher level, the SQL Interface, features programming through English-like syntax. At this level, nontechnical users are expected to be up and running quickly, creating some interesting relational data bases and applications dealing in English-like communications.

The third level, the Pro Interface, is for serious programmers who still want to write reams of programming code. Oracle, like other fourth-generation languages and tools (Focus from Information Builders, Inc., New York, N.Y., and Ramis II from Martin Marietta Data Systems, Inc., Greenbelt, Md. for example) began its commercial life on mainframes (in Oracle's case on Digital Equipment Corp. VAX minicomputers). Now, however, microcomputer-based versions of their software are offered at prices generally ranging from $1,000 to $3,000.

Despite the advances such fourth-generation tools bring to end-user involvement in DBMS, not everyone is a fan. "It used to be said that fourth-generation would be the way of bringing computing to the consumers," Norman Agin, vice-president of Martin Marietta Data Systems, Inc., explained. "My view is that fourth-generation languages are really ideal only for systems analysts, not end users. For one thing, the breadth of fourth-generation language features has grown enormously, so much so that it's not a simple tool anymore."

When Agin wears his other hat, he is president of Martin Marietta's IT-Software Division. This division has created a product called Keep-IT, a $450 relational DBMS tool that is the core module of a series of 10 IT software packages designed for IBM Personal Computers and IBM-compatibles. Agin described Keep-IT as "about as easy to use as any data base manager you'll find," emphasizing

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the pop-up menus and Help screens and the fact that the system does not "allow" a user to put in an incorrect answer. "Keep-IT is a great product for end users to make and manage data bases," Agin claimed, "but about 80% of Keep-IT users use only about 20% of its features. That's probably the case for many fourth-generation software languages." Share-IT, a multiuser version of Keep-IT, has just been released by the company.

"Fourth-generation languages are driving DBMS today," said John McCarthy, research manager at Forrester Research, Inc. in Cambridge, Mass. "But those languages are not that easy to learn. You still have to be a bit of a techie to program." Other observers are just as reluctant to credit fourth-generation languages as meaningful programming tools at the large systems level. Though nearly every DBMS uses some kind of fourth-generation query language, the creation of DBMS with these same languages does not necessarily follow.

**An English language capability will benefit amateur programmers in clerical and middle management more than mainframe programmers.**

English language capability will benefit those amateur programmers in clerical and middle management areas more than it will mainframe programmers. If fourth-generation languages break down, it's in program documentation. Using English to write powerful mainframe-based programs could be just as complicated as describing those same programs in English. It is not unusual for programmers to use several pages of English to describe the operation of a single page of code.

If anyone is to gain from fourth-generation software tools in the short run, however, it will be DBMS end users. One company slating its product at just such users is Artificial Intelligence Corp. (AIC), the Waltham, Mass., producer of Intellect. Intellect is a natural language that Jane Eisenberg, AIC's director of OEM and product marketing, was quick to describe as a "fifth-generation language," in what has become a more frequent effort by companies to differentiate their products from others in a crowded market. Intellect was forged by AIC's president, Dr. Larry Harris at Dartmouth College, N.H., in the early 1970s. Harris improved Intellect over the years after he founded AIC in 1975. First brought to market in 1981, Intellect was developed for IBM mainframe computers, and a version for Digital Equipment Corp. VAX computers has just been released.

AIC spokesmen pointed out the stress Intellect places on its fourth-generation language interface with users. "Unlike many other language interfaces, Intellect is a true natural language; it's what the user speaks and writes naturally," Eisenberg said. One Intellect user is the Hartford Hospital in Hartford, Conn. Dick Edlund, director of data systems, has been using Intellect since 1981 to build data bases and data base applications ranging from medical histories to human resources and patient billing.

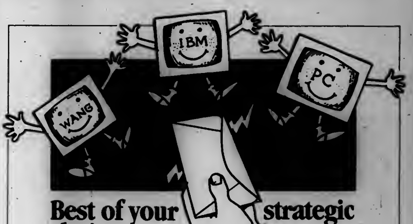
More than 100 users are now on the IBM 4300 series-driven system, most without previous DP experience. Sitting at their IBM terminals, Edlund said, users (many of whom are doctors and heads of hospital departments) can create their own relational data bases and reports using the Intellect Interactive Lexicon module. This module is a data dictionary that translates a user's individual programming terminology into a format usable by the software. The lexicon is immediately updated as the user writes more applications.

In tandem with Intellect/SX, a data base development tool, users have what Edlund described as a "forgiving" set of DBMS builders. This fact was instrumental in the hospital's selection of Intellect over IBM's SQL/DS relational data base language. Edlund said the hospital was simply not comfortable with the number of commands the IBM system required.

Large DBMS systems and tools will continue to be written in third-generation, procedural languages such as Cobol and Pascal, the stuff of old-line programming. Third-generation languages have a huge base of supporters that tend to regard anything fourth-generation with suspicion in relation to DBMS. Still, fourth-generation languages are making some headway in MIS as a quick way of satisfying a growing demand from corporate America's middle management for more end-user programming.

Fourth-generation software tools such as English from Mathematica, Inc., Princeton, N.J.; Clout and Clout2 from Microrim, Inc., Bellevue, Wash.; and Ramis II/PC from Martin Marietta Data Systems, Inc. are putting some DBMS power on micros and proving that DBMS don't always have to be spoon-fed from MIS. The success of such programs will continue to be a direct barometer of end-user involvement in DBMS.

*Kolodziej is a senior writer at* Computerworld Focus.



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# The Information Center And Productivity Tools: Working in Harmony

By Shaku Atre

The formal information center has celebrated its fifth birthday, and it can now be said that at least some of its promises have been kept. Because of the information center, users have, at least to some extent, become more self-sufficient. Their productivity, particularly in the area of decision making, has been bolstered. What have we learned in those five years? What should an information center offer if it is to increase users' productivity by making them more effective and efficient?

Information centers function within organizations as consulting and service facilities that enable departmental end users to access their data. Information is the analysis and synthesis of data, and company data is stored on hardware of many different shapes and forms. Mainframes, minicomputers and microcomputers all participate in making an information center a success, but the microcomputer is the major piece of hardware present in all information centers. Disguised as a personal computer, the long-sought-after multifunction workstation has arrived, and many experts are having trouble recognizing it. The workstation of today and tomorrow is not just an intelligent terminal — it is a brilliant one, and it will replace the dumb terminals in no time at all.

Meanwhile, however, the proliferation of 200 personal computer manufacturers, 800 models of personal computers and 30,000 software packages continues. For users, the old saying still holds true: "More is not necessarily better and less may sometimes be more." Today, three to four white-collar workers share one workstation, but by 1990, if predictions hold, the ratio of workstations to white-collar workers will be 1:1. In anticipation of that time, managers should make sure their information centers provide productivity tools in the form of hardware, software and applications to make workers more effective and then more efficient in their use of the workstation.

The many types of data processing that exist in organizations are there to make the organization more productive and, we hope, more profitable. Three levels of organizational support systems are depicted in Figure 1, Page 19. Today, the aggregate computing capacity of all personal computers now installed already exceeds by a wide margin the computing capacity of all installed IBM, Digital Equipment Corp., Burroughs Corp., Sperry Corp., Honeywell, Inc. and other mainframes. That statement, however, is only half the picture. Mainframes are used more than 90% of the 24-hour day, but most personal computers are used only discontinuously between the hours of nine to five. One simple way to increase return on investment is obvious: Promote sharing of partially idle personal computers.

Among the major productivity tools will be a mainframe-to-micro connection and, by the same token, the micro-to-micro connection. Software and communications (both remote and local) will provide more effectiveness and efficiency in addition to the powerful hardware at the workstation level. Remote communications, in the form of IBM's Systems Network Architecture (SNA) and X.25, will be an important ingredient, as will the local-area network. The compound electronic document of tomorrow will have as its major components data, text, image, graph and also voice.

With software and communications pulling in tandem to provide increased productivity, integrated software will become essential, and its key ingredients include financial software, word processing, record keeping, graphics, communications, educational programs and project management.

Why the need for software integration? How will it improve end users' productivity? In spite of the ever present talk about software integration, not everyone agrees on exactly what benefits are provided by integration. Three major areas of software integration stand out:

- Provision of a uniform user interface that makes the software easier to learn and use.
- Easier passage of data from one application to another so a minimum of redundant data needs to be stored and no cumbersome interruptions are necessary.
- Easier switching from one application to another (a poor person's parallel processing).

**One simple way to increase ROI is obvious: Promote sharing of partially idle personal computers.**

These communication powers will let an end user on one personal computer access data from another personal computer as well as from the mainframe. In future, personal computers are going to drive today's minicomputers into anonymity, obscurity and, finally, extinction. Data bases stored on mainframes and personal computers are competitive weapons for end-user productivity, if the data bases can be interrelated.

Data to be shared by various user groups should be stored in a data base, a collection of selected data about an enterprise with multiple users. The major theme of a data base management system (DBMS) is, then, the interrelatability of data. The question then becomes how the personal computers installed in an organization can help the information center users gain access to interrelated data.

The architecture depicted in Figure 2 on Page 19 is one solution that can be implemented today. The customer master file (data base), which resides on the mainframe, could be managed by a mainframe DBMS, such as one of the following: Applied Data Research, Inc.'s Datacom/DB, Cincom Systems, Inc.'s TIS, Computer Corp. of America's Model-204, Cullinet Software, Inc.'s IDMS/R, IBM's IMS and DB2, Information Builders, Inc.'s Focus, Martin Marietta Data Systems, Inc.'s Ramis II and Software AG of North America, Inc.'s Adabas.

Extracts could be taken from the mainframe-based customer information file using the various data base vendors' corresponding products. The data

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**Office Systems Level**

Electronic mail, electronic
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communication with other processors

**Workstation Level**

- Personal computer
- Remote data access (downloading and uploading)
- Numerical analysis (spreadsheet)
- Sorting and searching of data (DBMS)
- Memo and report writing (word processing)
- Business graphics
- Project management

Figure 1. Organization Support Systems

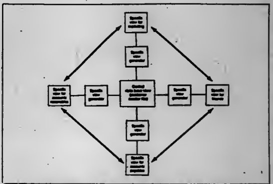

Figure 2. User-Accessible Subset of Central Data Base

extracted from the file and downloaded from the mainframe can then be formatted for use within other personal computer products, such as Lotus Development Corp.'s 1-2-3 or Symphony. Users could then work with the data on their own personal computers, using products with which they are familiar.

Compatibility of the downloaded mainframe data with the personal computer products varies from vendor to vendor. The selection team from the information center will therefore have to be cautious in finding out whether any programming is needed to make the downloaded data compatible with spreadsheets and other types of software users have on the personal computer.

The promise of distributed DP made in the '70s can be delivered with today's personal computer architecture and the software made available for it in the organizational structure of the information center. User groups from finance, marketing, accounts receivable and accounts payable should be able to transfer data and applications between the mainframe and the personal computers without needing to know where their data is stored and how it is accessed.

One of the major concerns in the data base area is that redundantly stored data will have different updates on different personal computers. Triggered by IBM's certification that two types of DBMS (IMS for production and DB2 for end-user computing) are better than one, corporations have started exploring alternatives and/or supplements to their production DBMS. If no guidelines are set for duplication and access of data, the environment will come into disarray; data base, the productivity tool, will instead become data base, the menace.

The incompatibility of hardware and software on the levels of the mainframe and micro combined with the presence of multiple DBMS in a corporation means that environmental independence must be provided by some front-end facility. The front end to the various DBMS or different hardware systems should be designed to route requests — for data and responses — transparently between application programs. A single system image must be provided. Isn't that really a distributed data base environment? Which data base technology will provide all these capabilities?

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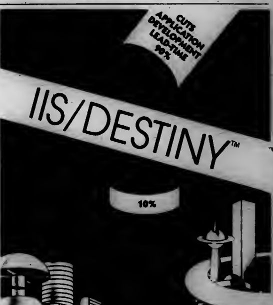

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data base technology. Relational systems offer the most flexibility in responding to the unanticipated requests of end users as well as the capability of implementing the never-ending changes of the business world. The integrated tool that will provide the most productivity to the end user will consist of a number of technologies, as depicted in Figure 3.

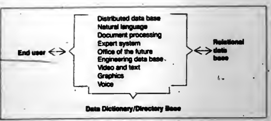

Figure 3. Integrated Productivity Tool For End Users

With the distributed data base technology to achieve the productivity gains to the fullest extent possible, the following guidelines should be established for mainframe-micro connection:

- Microcomputing is not a fad. It is here to stay. Establish guidelines for acquisition of microcomputer hardware, software and applications. An in-house computer store may not be cost-effective.
- Capacity planning for mainframes will be a losing game. Establish charging guidelines.
- Downloading and uploading of data is still in its infancy. Establish guidelines for volume of data to be transferred as well as the time frames for transfer.
- Establish backup, recovery and security guidelines for floppy diskettes as well as for downloading and uploading.
- Establish guidelines for providing integrity of data on mainframes if the downloaded data on microcomputers will be stored redundantly.
- Acquire workstations with communications in mind for mainframe-micro connection as well as micro-micro connection.

In summary, the types of productivity tools that should be provided in the information center are the following:

- A menu-driven professional office management tool that allows for sending and receiving notes; comparing, proofreading and distributing documents electronically; scheduling meetings with other users; accessing information center announcements; maintaining a personal calendar; and performing many other management activities.
- Analysis, design and validation tools for application development.
- A data dictionary directory supporting all phases — design, coding, testing and production.
- A full-screen editor integrating graphics and WP.
- Management tools for project planning, control and teaching.
- An on-line data base of software designs and programs.
- Multiuser support.
- Computer-based training with an attractive medium like interactive video disk.
- Prototyping capabilities.
- Spreadsheet software that puts checks in the results for validity and prepares documentation.
- Comfortable keyboards (some companies like Key Tronic Corp. and Wico, for example, have made more advanced keyboards).
- High-capacity hard disk (if the end user thinks 10M bytes is more than plenty on a PC-XT, just wait six more months).
- Charge-back software (not too complicated).
- Electric-surge preventer.
- Backup utility
- Correspondence quality and graphics capabilities in one printer
- Office desks (with personal computers in mind) with special construction for personal computers, hard disk and keyboard — and above all, designed with aesthetics in mind so that cluttered wires can be hidden.

One warning about purchasing these productivity tools: the software is advertised only with buzz words. Some industry buzz words that seem to be used for most microcomputer software are *integrated*, *user-friendly*, *relational*, *data base management system*, *menu-driven* and, of course, *PC-compatible*.

The explosion of personal computer technology will not only bring us application programming without application programmers, it will have another effect. We are all going to be application programmers — just as we have all become telephone operators. Firms developing information-based products must choose application development environments that satisfy conflicting demands of easily operated software for end users and application development power for programmers. DP professionals will do applications programming side by side with end users, but on micros instead of on mainframes.

The information center, which will be a utility facility, will be taken for granted, in the same way we now take for granted electric power and water.‡

◆

*Atre is president of Atre International Consultants, Inc., a Rye, N.Y.-based firm that provides consulting and training in information centers, data bases and data communications.*

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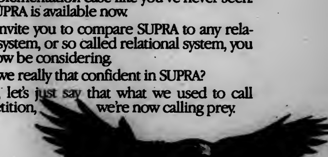

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# Transforming The Data Center

*Systems software is changing the data center's capabilities, just as the data center changed companies' information needs. The new role for the data center will help everyone.*

## By Russel M. Artzt

Get ready for another transformation. A movement is now under way to automate the data center and, if it's successful, it will transform the way the data center operates, just as the data center's automation of the corporation transformed the way companies do business. This time, however, the catalyst will be advanced systems software.

Although sophisticated software programs have been used to automate user departments, even the programming departments of many data centers have yet to adopt specialized software to improve their own operations. Jobs are initiated, scheduled and controlled manually from input to output, causing a tremendous loss of time and increasing the chance for errors. The data center's two most valuable resources — computers and people — are wasted.

Data center efficiency is an intrinsic part of the corporate competitive edge, and automation can sharpen that edge. The increasing complexity of data processing, economic constraints on the corporate DP investment and the corporation's own dependence on the data center require sophisticated management solutions and the technology to support those programs.

There was a time when management — and even the DP department — did not realize the importance of the DP function. That attitude was reflected in the way the data center operated. Today, however, data centers across the nation are responding to more advanced needs, both within the center and from the corporation. Today's systems software should meet those needs by offering the data center the same capabilities — streamlined service, support and training — that applications software offered to end users.

Although it has taken vendors many years to produce the right kind of systems software to automate the data center, the concept is not new. The first software for operations, in the mid-1960s, addressed questions such as: How do

we avoid wasting CPU time? Why must processing operations stop while the operator loads another tape? How do we avoid destroying vital data?

These questions gave birth to the concept of multiprogramming, designed to maximize machine usage. However, hardware vendors most often addressed this problem by adding more hardware at a time when mainframe hardware costs were extremely high. The systems software vendors did develop to provide the interface between man and machine came bundled with the hardware.

Independent vendors' existence depended on good software, and they helped users understand the additional freedom and power purchased systems software could give them in designing applications and streamlining the data center. When hardware vendors unbundled software from hardware pricing in 1969, the concept of automating the data center began to grow, as did independent systems software vendors.

On the applications side, independent vendors were successful in end-user departments because of the economies realized through using packaged software. Nevertheless, the data center was not viewed as a user department. The inital steps toward automating the data center took the form of filling the gaps left in the operating systems with systems software designed to solve immediate problems.

Before the advent of packaged programs for these areas, data center managers' choices were limited: maintain the status quo and lose all opportunity to gain control of data; hire more people to execute these tasks manually; or develop software internally to manage these functions, a prospect that could take many staff years before it would be able to be fully operational.

The first software packages produced by independent vendors in the early 1970s addressed these problems individually and narrowly. The real impact on software development didn't occur until the mid- to late 1970s, when several events began the process of automating data center operations:

**Software systems must be designed as one comprehensive package that would let data center managers anticipate and plan work loads.**

- Drive to maintain competitive positioning: Business needed a more immediate access method to enormous amounts of data to maintain a competitive position. When on-line processing was introduced, the problems of disk space availability and managing that space became important.
- Need for data security and management accountability: Federal laws and regulations made top management in companies directly accountable for the proper use of data, and data security measures then became critical needs.
- Growth of concern by senior management: Corporate management no longer regarded DP as magic. As executives became aware of the risk and impact of poor data center management on their businesses, they began to promote professional management techniques in the data center.

Several key technological events also contributed to the development of systems software, which puts the DP manager in control of data center resources. Introduction of on-line processing spurred growth of the permanent disk to hold current information. Corporations have recently expanded direct access storage device (DASD) capacity by more than 50% annually. Although managing DASD space has become a necessity, it is still handled manually, resulting in misused and wasted resources. In addition, transferring data from disk to tape for storage creates file management problems.

Software has been developed to provide efficient use of DASD and often helps to delay or avoid the unnecessary purchase of additional disk packs or conversion to larger hardware systems. Time formerly spent on manually allocating disk space can now be spent on more productive tasks, increasing operator efficiency. By integrating DASD management with tape library management, software allows data sets that aren't used frequently to be archived, providing better security and increasing usable DASD space. Among the benefits systems software packages brought to disk space and/or tape management systems are the following:

- Up to 30% of the disk space capacity in a disk-oriented installation has been freed, and tape processing throughput has been increased by as much as 30% in tape installations.
- Data files have been made more secure by protecting them against accidental loss of vital data and preventing unauthorized access to sensitive files.
- Management of peripheral resources has been improved by eliminating reruns, freeing up tape drives and increasing usable DASD space.
- The manual process of tape library and disk storage management has been replaced by fully automatic functions.

By providing the means to understand exactly how the DP resources have been and are being used, management can examine the performance of each hardware component that makes up the computer system and analyze the performance of all jobs being run.

Performance measurement tools promote greater control of hardware resources by providing historic data on computer use; providing an on-line computer job accounting facility and the ability to bill corporate departments for services rendered; serving as a diagnostic tool to see inside the computer to see how jobs compete with each other for resources; and enabling the user to diagnose the performance of an individual program. Other factors also influenced the creation of systems software to automate the data center. Corporate concern for disaster recovery spurred contingency planning by data center managers and software development to address this need. The DASD and tape/disk management facilities fill some requirements for disaster recovery by automatically ensuring that critical data files are backed up in a vault or off site.

Job documentation in advanced software should automate disaster recovery by creating vital operational documentation that would take hours by any other means. It should automate the process by centralizing job documentation and offer full support for disaster recovery plans.

Recent software developments not only provide an additional level of security in addition to the usual passwords and access codes to protect resources, they also audit access to them. These packages should allow a user to place any desired level of security on any of the data center resources, terminals, files or tape volumes.

Today, a single piece of software can plan and schedule the production work load automatically, forecasting potential bottlenecks and evaluating alternatives to use the resources better. Scheduling software that has been designed to communicate with other areas of the operation, such as disk space management, can play a role in preparing data needed for upcoming jobs.

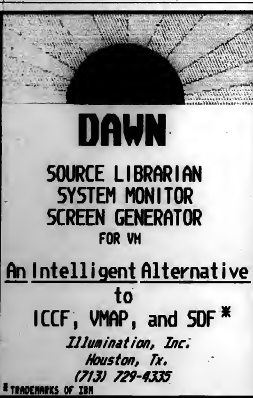
When initially introduced, most of the systems described here were aimed largely at solving critical problems in a mutually exclusive way. The industry is now moving into an era where software systems must be designed as one comprehensive package that would give data center managers the means to anticipate and plan their work loads and achieve new levels of productivity.

A few intangible features are still required to complete today's state-of-the-art products. These features are automated service and support, more effective education and training techniques and closer ties to software vendors. Service and support constitute a very large issue for data center managers. Vendors in the business of providing to clients a product as important as information accessibility will find that service has to be a major component of the product mix. It is as important as any line of code.

Computers and software are obviously the effective way to track and maintain such an extensive service operation. Vendors will have to become more responsive and innovative in providing service and support, as corporate management increasingly recognizes the importance of the data center's role in total corporate performance.

≡

*Artzt is senior vice-president for development at Computer Associates International, a software firm in Jericho, N.Y.*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# Multitasking Operating Systems - Is The Contest Already Over?

*The tug-of-war among vendors of multitasking operating systems seems to be reaching its end. Is Unix the big winner for the '80s? Perhaps the real question is: Is there a contest?*

## By Lee White

The tug of war taking place among operating systems and their various proponents may soon be at an end.

Not all operating systems are involved in the contest, of course. In the large mainframe/management information systems world, operating systems are defined by the vendor, with the user silently acquiescing. Examples of vendor-defined mainframe operating systems are IBM's VM and MVS and Digital Equipment Corp.'s VMS. In the stand-alone microcomputer arena, the now accepted standard is Microsoft Corp.'s MS-DOS. The third category is the networked microcomputer or supermicro. Its operating system, and the only battle left, really, is Unix.

What differentiates the third category from the other two is the fact that it is user-driven. According to Frank Zehna, president of AIM Technology, Inc. in Santa Clara, Calif., the driving forces behind the Unix standard are the scientific/engineering community, the federal government and the aerospace industry. Now that Unix has become a big player, bid specifications name Unix as the operating system. Vendors that cannot offer Unix-based hardware are effectively cut out of the bidding process, which most can ill afford.

Zehna even takes the Unix standard a step further; he insisted the Unix that will drive the marketplace will be AT&T's Unix System V. This would seem contrary to DEC's direction; DEC has released the revolutionary Microvax II, which runs Berkeley Unix (also known as 4.2). Zehna had high praise for the Microvax II but suggested DEC will probably change direction from the Berkeley version to System V. "DEC is in the same position every other supplier is in. In order to bid [on federal contracts], you have to bid what's compatible, and that's System V." In fact, the next release planned for System V (February 1986) will include most of the Berkeley enhancements, according to Zehna, which in his opinion further fosters the migration path toward one standard. "You can't fight that. You can try, but you're going to lose," Zehna explained.

Katie Klosterman, market research supervisor at International Data Corp./Yates, said that, from the pure Unix standpoint, there won't be any fight to lose. In many ways Unix is the answer to a maiden's dream. As far as vendors that sell products to the Unix environment, switching from machine to machine, even among different Unix systems, takes at most a day to port. "Although the marketplace is standardizing now on System V, it's kind of a moot point." Klosterman said. She cited Apollo Computer, Inc.'s Domain/IX workstation, which runs its own proprietary operating system, Berkeley 4.2 and System V alongside each other. "You can actually run a program that calls for commands in 4.2, then calls for commands in V, and it will recognize either one. If [the user] likes a couple of 4.2 commands but knows V intimately, [the user] can use those 4.2 commands and still work basically in V," Klosterman said.

Klosterman sees more compatibility down the road, but tempered her comments with some realities. Among her predictions was the demise of Berkeley Unix. Even California-based Sun Microsystems, Inc., whose Bill Joy is the father of Berkeley Unix, has come out in support of System V recently, she said. Sun is about to announce 4.3, which Klosterman has heard is not even compatible with the 4.2 version.

Mark Hatch, Unix product manager at Apollo, agreed that eventually System V will be *the* Unix, having borrowed more and more features from Berkeley 4.2.

He predicted that when AT&T comes out with the next release of System V, it will contain heterogeneous networking capabilities that will "leapfrog Berkeley." Hatch cautioned, however, that Berkeley is a large force in the engineering community, and its demise is unlikely in the short term.

The end will probably come because of AT&T's superior funding. "When that time comes, 4.2 will probably fade into the sunset," he said.

What is not expected to fade off into the sunset is Microsoft, Inc.'s Xenix, a Unix-like system that IBM has chosen as the multiuser, multitasking operating system for the IBM Personal Computer AT.

According to Bruce Steinberg, marketing communications manager for The Santa Cruz Operation in Santa Cruz, Calif., there are more Xenix installations worldwide than all the Unix installations together. Steinberg described Berkeley 4.2 as "a kind of utility. It's just there. It's been there for a long time; places that already have it will probably stay with it."

Giving Berkeley its due as a "niche" Unix, users are still left wondering whether the real tug of war, when and if it comes, will be between Unix System V and Xenix. Not a chance, according to Steinberg, who explained that

*(Continued on Page 29)*

# . . . And In This Corner . . .

When Unix hit the streets, users rejoiced at the prospect that compatibility and portability might be, at least to some extent, just around the corner. It now appears, however, that instead of compatibility, vendors are modifying, refining, even reinventing the wheel. Most often the reasoning behind such actions is the creation of a better product.

Such was the case with Multi Solutions, Inc., of Lawrenceville, N.J., creators of the Unix-like S1 operating system. Brought to the market in early 1984, S1 claimed portability across 8-bit to 32-bit microprocessors, support for up to 256 parallel processors, the ability to read and write files to and from most microcomputer operating systems and machine independence.

S1 was written in a high-level language called SL, developed by Robert R. Knight, a former professor at Princeton University. According to Patricia McMahon, marketing support manager at Multi Solutions, Knight came from a heavy mainframe environment but did most of his consulting work on the Z80 microprocessor. Knight knew the Z80's days were numbered. He also wanted the mainframe functionality he was used to.

Knight began work on a language he hoped would lead to an operating system that would provide the advantages of the mainframe, the better facets of Unix and none of the disadvantages of existing microcomputer operating systems. "He took the ideas of C and refined it to what I think [the developers] were trying to make C," McMahon said.

Knight's SL made possible the creation of S1. In addition to the features of portability and compatibility, McMahon claimed that with S1, a system can be running on a totally new chip architecture within six months. Among the distinguishing features of S1 are the interfaces within the self-contained modules or subsystem which have no necessary interdependence upon each other. This is particularly important, McMahon said, to the computer hardware manufacturer interested not only in the business market, but also in the engineering/scientific and home computer communities.

Multi Solutions and other Unix-like development organizations must answer two questions that are much more interdependent than the subsystems within S1. The first question is just as important to Microsoft and AT&T as it is to Multi Solutions: Is Unix going to become the operating system of choice for more than the engineering and academic world?

The second question? In the face of standardization on System V, which seems a fait accompli, is there a place for the maverick multitasking, multiuser operating system?

In November 1984, Multi Solutions entered into an exclusive five-year agreement with Computer Engineering and Consulting Ltd. of Tokyo to license and distribute the S1 operating system to Japanese companies. This agreement will guarantee Multi Solutions a minimum of $40 million over the life of the agreement.

The same month, Multi Solutions announced it had signed a licensing and distribution agreement with Entronix AB, a Swedish company and member of the Ventronic Venture Electronic AB group. Under this three-year agreement, Entronix B would market the S1 operating system with its line of VME Bus 68000 computers worldwide. However, to date, no major computer hardware companies in the U.S. have adopted the S1 operating system.

McMahon is sure that Multi Solutions and its S1 operating system have a long and profitable future. She cited its superiority to Unix as the key to its success. "Unix doesn't have the real-time capability in any one system and it doesn't have the networking capabilities that are necessary, either," she insisted.

Management at Multi Solutions has taken its confidence a step further and has formed a company that will write applications software for S1.

Whether the upbeat mood at Multi Solutions continues depends to a great extent on whether true Unix itself becomes a standard operating system. If so, specialized Unix clones, even incompatible ones, might find their niche markets.

*By Lee White*

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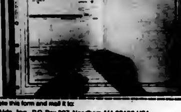

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*(Continued from Page 28)*

bringing a Unix-like system on board involves two steps: certification and verification. If a piece of software is multiuser and multitasking and has all the functionality of System V, it fits the System V verification definition. Certification, on the other hand, means that an operating system is true Unix. Within a month, Steinberg said, Xenix is going to be System V.

Steinberg sees a coming together of the Unix/Xenix camps. Xenix, which was based on Unix System III, is merely a refinement of the original, he said. If there was confusion, it had to do with the fact that AT&T put large amounts of money into advertising System V, while not acknowledging that Xenix ran on its own 6300, he added.

The phrase Unix war is a concept to be avoided at the risk of alienating users, according to Steinberg. "It was more like a crusade which was not exactly circumvented by the approach to the market taken by AT&T and Microsoft and a whole bunch of other vendors that were still trying to find a market niche for their own systems. Historically, the lack of definition tended to fragment the market."

But is the glorious visual of AT&T and IBM locked in passionate embrace enough to give microcomputer users everywhere that warm and toasty feeling? Hardly. Some very hard questions still remain unanswered.

The first question has to do with Lotus Development Corp.'s 1-2-3. There are millions of Lotus files out there in corporate America, happily residing on floppy and hard disks on IBM PCs, PC XTs, PC ATs and PC-compatibles running MS- or PC-DOS 2.0 through 3.1. What happens to all these Lotus files with a new operating system?

A high-level manager at an organization whose mission is to develop Unix applications stated that his group is well aware that Lotus drives the micro market right now. "The issue is not whether you're dealing with Lotus 1-2-3 but whether you're dealing with 1-2-3 functionality, whether you're dealing with systems that can read 1-2-3 files, whether you're dealing with a system that has exactly the same interface as 1-2-3. That issue is fully acknowledged, but it's a little sensitive right now."

The second question is whether marketers in Unix-land can overcome objections to Unix as an unfriendly operating system. Steinberg sees this objection as a smoke screen, stating only people who came up through the system really care about operating systems, anyway. DOS was seen as a friendly system only because it was accompanied by a lot of friendly applications, he said. Unix "has allowed itself to wallow in its reputation of being a very deep and arcane system. A good operating system will be invisible to the user and will be very friendly to the application," concluded Steinberg.

The third and final question, and one in the mind of most MIS professionals, may be the most important of all. What, in the near- and long-term, will Unix contribute to making computing easier and better, resulting in a bottom line strategic and competitive edge? If a Unix or Unix-like operating system will allow MIS departments to switch hardware on a ad hoc basis; decrease the amount of programming time necessary to develop and refine applications; and at the same time allow the micro-, mini- and mainframe computers to function as a unit in a true networked environment, then Unix will indeed succeed.

It would seem that Microsoft and AT&T's mission would be to listen to the user community and respond to that group's needs. Things really aren't too bad on the end-user computing front right now. Applications software houses have been responsive and the grumblings have quieted. Users will have to be convinced Unix will give them something they really need. If this is not done, the Unix crusade will be more like, "What if they gave a war and nobody came."

■

*White is a senior writer at* Computerworld Focus.

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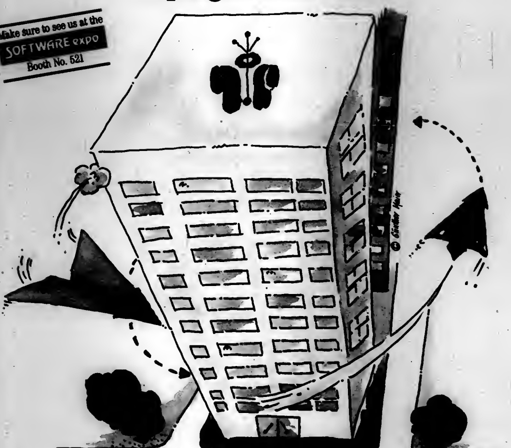

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# Topview — Marvel or Mishap?

*IBM's Topview has not turned out to be what users were led to expect. What's wrong with this much-touted software? Can Topview be made viable, or is it just a Big Blue mistake?*

## By Morton Rosenthal

Integrated software packages have not prevailed on the personal computer because they're not the true answer to integration. By trying to be all things to all people, most integrated packages offer a set of compromises that fail to meet the needs of most users who run more than a single application on the personal computer.

What these users really need is an integrating environment that will allow them to combine their favorite stand-alone programs into a single integrated system. The ideal integrating environment would let multiple-application personal computer users start a program, quit the program and start another without losing their place, transfer data among programs and even have programs run concurrently.

Sensing this need in the marketplace, IBM recently introduced Topview to do all the things an integrating environment should do. And nobody likes it.

Most people who have tried Topview have concluded the product is virtually unusable in its present form. What's wrong with Topview? Let us count the ways in which IBM went wrong.

Topview requires too much memory. It won't run most programs in background. Even when it can run a program in background, it can't drive a printer from background. It doesn't handle bit-mapped graphics. It allows file transfer among programs only if the receiving program has been written to be compatible with this feature. It requires the user to set up a

Program Information File for each program it runs, but the user may or may not have the information to do so. It doesn't run DOS batch files, and it's slow.

In spite of all its problems, however, Topview makes a lot of sense. Pretend for a minute that Topview does what it's supposed to do. After selecting the best of the stand-alone programs, you could use Topview to integrate them into a single system. Topview would let you run a program by opening a window on the display, and you could switch to a new program merely by opening a second window. You could return to an application at exactly the point where you left off, or you could let the application run in the background until you returned to it. The foreground program could occupy the full screen, or you could simultaneously look at multiple programs running in multiple windows.

These capabilities are powerful and IBM is certainly on the right track in thinking that any software that can effectively provide such capabilities is sure to be a hit in the marketplace.

What, then, can IBM do to make Topview viable? Or is Topview's future beyond IBM's control?

The next generation of hardware and software will solve Topview's memory problem. Huge amounts of random-access memory will be available at a reasonable cost and, of course, a new version of the PC operating system will allow the PC to address memory in far greater amounts than the present limit of 640K bytes. All in all, it should be a simple matter for IBM to modify Topview to work with a large memory system.

The slow operating speed can also be corrected by IBM in an enhanced version of the product. The change is necessary and IBM will make it if it wants Topview to get off the ground.

Topview's lack of graphics capability is a more serious problem. Although creating a graphics-oriented user interface is easy enough, integrating graphics programs is a horse of a different color. It's not difficult to store text when switching from one program to another, but storing an elaborate graphics display is far more challenging because so much more information is involved. Still, this is a problem IBM can solve in future versions of Topview.

A few of Topview's problems, however, cannot be so readily solved because they involve issues of compatibility between Topview and the applications programs running under it. By and large, the solutions to these problems aren't under IBM's control.

**A few of Topview's problems cannot be so readily solved because they involve issues of compatibility between Topview and the applications programs running under it.**

A major problem is background processing. For Topview to allow a program to run in the background, the program must use all standard PC-DOS conventions. Because handling input/output (I/O) operations through PC-DOS slows down a program considerably — especially when writing to the screen — most popular PC programs bypass PC-DOS and make direct hardware calls. The solution to this problem is complex, but a safe prediction is that, with few exceptions, the only programs that will ever run in Topview's background are those that have been designed by their developers to be compatible with Topview I/O conventions.

File transfer is another problem. Applications programs must be designed (or redesigned) to accommodate Topview's file-transfer buffer if they are to be able to receive files from other programs.

Designing an applications program to work with Topview is obviously the job of the software developer. Most developers are hesitant to adapt their software to Topview because they're not sure Topview will become popular. After all, if Topview fails to catch on, why waste development time to support it?

Moreover, a few developers are avoiding Topview compatibility for quite a different reason: They're scared to death IBM's entry into the software arena will put them out of business. Although they'd like to see an integrating environment standard emerge, they'd rather have that standard set by a company other than IBM.

And another company is, in fact, in a position to establish the standard. Microsoft Corp. recently released Windows, a multitasking integrating environment many think will pose a real challenge to Topview. Unlike Topview, Windows has bit-mapped graphics and its own screen interface; like Topview, however, Windows requires that applications programs be written to take advantage of its special capabilities.

Although Windows is not yet available at retail (only the OEM version has been released), it has a fighting chance of becoming the integrating environment standard. Microsoft's relations with OEM and developers are excellent; after all, Microsoft is the company that developed the MS-DOS standard. In fact, if Windows or its successor started to catch on, it wouldn't be surprising if IBM acquired the rights to it and offered it as its own. If that happened, we'd have a real standard.

A third contender for establishing the integrating environment standard is Digital Research, Inc., which sells GEM Desktop, a windowing program that provides an interface like that of the Apple Computer, Inc. Macintosh. The product does not provide multitasking, however, and most observers doubt it will ever be taken seriously as an integrator — at least in the business market.

Nevertheless, one group of users may latch on to GEM Desktop. The product has a definite appeal to executives and other light-duty users who want an easy-to-use, icon-oriented interface, but who don't want to buy a Macintosh. The size of this group is probably not sufficient to establish GEM Desktop as any kind of standard.

Some industry observers think IBM's recent Topview giveaway (a free copy with each hard-disk XT sold to dealers) was a ploy to get Topview into greater circulation and thus increase its chances for becoming the standard. If this was IBM's strategy, it won't work. It will take more than high circulation to establish a product that few people use more than once.

In the meantime, what are users to do while waiting for the standard to emerge? How will we ever juggle all those high-powered programs we'd like to run all at once?

Do nothing. Let Microsoft twist the developers' arms to write software for Windows while it twists its programmers' arms to complete the retail version of Windows. Watch IBM use its marketing muscle to get its enhanced Topview into the hands of every PC user it can. Then, when your favorite programs become available in special versions for a particular integrating environment, you can assume that environment has been established as a standard — and you should give it a try.

But don't hold your breath waiting. Using an integrating environment to integrate stand-alone programs on the PC is an excellent concept, but for the experienced PC user the concept has a long way to go. In the meantime, just relax and continue using your software the old-fashioned way. You aren't missing a thing.

* * *

*Rosenthal is chairman of Corporate Software, Inc. in Canton, Mass., a firm that supplies personal computer software to large corporations and helps customers select and use PC software.*

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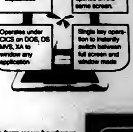
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# So You've Chosen Your 4GL – Now Can You Cost Justify It?

### By Gary G. Rossell

Selecting the right fourth-generation language is difficult enough; cost justifying the choice is another problem altogether. In 1984, as vice-president of data processing in charge of support services for Meridian Bancorp, Inc., I headed a team that began a search for an information center tool for corporatewide use. Meridian Bancorp is a $5.6 billion financial institution, the fifth largest bank holding company in Pennsylvania and a Fortune 500 company.

Only after we had made our decision, documented our reasons for the selection and obtained management approval did we begin the process of cost justification. We intentionally separated selection from justification to ensure that we had the right information center tool before we figured out how to justify the expense. Our tool was Nomad 2, a fourth-generation language data base management system (DBMS) developed and marketed by D&B Computing Services.

We always separate selection from justification to ensure that we do not come up with a system that, although it fits a budget, might be merely the best choice of a group of second-rate products or one that does not have all the necessary features for our organization's needs. Any other kind of planning would be a bit like deciding you could afford to spend only $6,000 on a new automobile before deciding that you really needed a passenger van that could hold eight people in relative comfort. We do not ignore the amount that we plan to spend on a new product, but we do separate selection from justification.

Naturally, if we could not cost justify our choice, we would have to turn to the three R's: regroup, reassess and, possibly, reselect. The inability to cost justify would definitely makes us reexamine our selection decision in depth.

Cost justification is taken seriously at Meridian Bancorp. We have learned to talk business English to management rather than computerese. We communicate in terms of return on investment (ROI), cost reduction and avoidance and efficient operations — not in acronyms.

We commit to short-term deliverables and make the believer/leader sponsor responsible for its implementation. We also commit the selection/justification team to deliver the product. This same sense of commitment conveyed in the proposal to management is built into the entire process of selecting and evaluating any significant new system.

That is, we make sure at every stage of these processes that we can prove to our own satisfaction that we have rigorously and thoroughly examined all the alternatives, that our choices are logical and that they can be explained in business terms. This examination and explanation is expressed in terms of what is best for the company, the business and the users rather than what will serve the primary interests of management information systems.

Even thus prepared, cost justification — after screening, evaluation and selection — is an important exercise, especially if you are in charge of it and getting ready to say to senior management: "I believe in it. I commit to it. I will deliver it for the company. You can hold me accountable."

Naturally, the justification is related to the selection criteria for a new system and to our initial goals. In the case of an information center tool, we were primarily interested in an information center tool for end-user computing.

Cost justification of a system requires a completely different mental set and different procedures from those required for merely identifying criteria and goals. But cost justifying is much easier after you have become familiar with the product's features and capabilities.

We decided not to limit the scope of our cost-justification efforts and expanded them to the following:

- Reduced applications development costs.
- Hard-dollar and soft-dollar savings.
- New business opportunities.

| Programming Work Content | |
|---|---|
| ≣ Develop Screens<br>≣ Edit Data<br>≣ Add, Delete, Change Logic<br>≣ Match Files<br>≣ Table Look-Ups<br>≣ Code File Definitions<br>≣ Code File Relationship Logic<br>≣ Standard Functions<br>• Date Arithmetic<br>• Check Digits<br>≣ Reports<br>• Page Numbers<br>• Totals<br>• Sum Into Matrix<br>• Spacing/Headings<br>• Sort | 80% |
| Unique Logic | 20% |

**Standard Function Results**

| | |
|---|---|
| ≣ Quality of Code↑ | ≣ Maintenance Changes |
| ≣ Testing Decrease | ≣ Prototype Possible |
| ≣ Documentation<br>• System↑<br>• Program↑ | |
| ≣ Productivity↑ | |
| ≣ Post-Impl. Errors↓ | |

Figure 1

The identification of reduced application development costs required an analysis of the programming process. Figure 1 lists the major tasks that represent the program coding process.

Our analysis indicated that the basic tasks require 80% of the coding time, while the development of unique logic for a specific application takes the other 20%. As a result of this analysis, we identified the following cost savings for applications development using a fourth-generation/language DBMS:

- Less coding time than with Cobol.
- Less training time than with Cobol.
- Faster start-up by entry-level programmers.
- Lower average salaries for trainees.
- Decreased testing because of canned and debugged standard functions.
- Reduction of programming errors also because of the same canned functions.
- Reduced effort in maintaining changes.

In addition to identifying development savings, our analysis confirmed that a fourth-generation language could simplify basic coding tasks and make it possible for end users to accomplish them easily with a minimum of training.

We identified the following obtainable cost savings:

- Reduction or elimination of time-sharing services.
- Assumption of jobs being handled by service bureaus.
- Avoiding the hiring of contract programmers.
- Avoiding the purchase of minis and micros.
- Eliminating one report writer software package.
- Avoiding the purchase of an add-on option of a new software package.

With the concurrence of one of our users, we were also able to identify one new short-term business opportunity through the application of the fourth-generation language/DBMS to an existing manual system. The following other, less tangible opportunities were also identified:

- Reducing the invisible backlog of jobs that are never requested because users have given up trying.
- Tackling jobs with less obvious savings or benefits that have been put off due to low priorities in DP.
- Meeting the accelerating demand of personal computer end users who are outgrowing their personal computers and/or need data from the mainframe.

Later, we also plan to look at the possibility of doing a portion of the forms preparation work of large numbers of people in the corporation.

After exploring all these factors, we were able to provide two separate cost-justification estimates — either of which proved the ability of the system to pay for itself.

We are currently developing the new business opportunity option using the package's procedural and nonprocedural language-handling facilities for one of Meridian Bancorp's major departments.

■

*Rossell is vice-president, data processing, in charge of DP support services for Meridian Bancorp, Inc. in Reading, Pa.*

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# Software Package Contracts - What Non-Lawyers Should Know

### By Lawrence Szczech

Let's assume you are the financial or operations manager of a large organization that is about to bring in some new software. What will you advise? Have you given enough thought to this area to offer your company some protection? Without trying to impersonate a legal expert (and this article does not give legal advice), I've put together some pointers that may prove helpful in negotiating software package contracts. These guidelines are drawn from my firm's experiences as vendor and user.

The first point to remember when negotiating software contracts is that users don't buy software packages; they lease them. Because a lease carries with it no inherent rights of ownership, the only rights the organization has are those outlined in the leasing agreement or contract. The organization that wants to ensure that its software objectives will be satisfied will do so before signing on the dotted line.

When the purchase is a micro software package, the terms of the license agreement are cut-and-dried. They're usually printed on the carton containing the magnetic cartridge or diskette. In some states — Louisiana, for example — removing the shrink wrapper means agreeing to the terms.

Most IBM System 34/36/38 software package vendors will also have a prepared agreement, albeit one more open to negotiation. The professionalism of vendors goes a long way in determining their willingness to negotiate. Some vendors that are more open to an individual firm's needs will allow the addition of clauses that address legitimate business objectives. Almost all vendors, however, will require that the standard terms remain unchanged.

The first and last step an organization must take in leasing software is to have a lawyer look at the agreement. Lawyers are no protection from the burdens that may have to be carried later. Ultimately, your shoulders will bear the success or failure of any software contract. As the financial or operations manager, you should carefully review the contract's coverage of the following four areas: performance, pricing, timetable and add-ons.

In the following discussion of these areas, a one buyer/one vendor relationship is assumed. If the software package has been purchased from one vendor, that in turn uses another company to install and/or modify the package, make sure all parties and their roles are tied together in the same agreement.

**Performance:** The lack of standards in the software industry increases the need for defining what a package is supposed to do for its user (for example, how it should perform in your environment). Many users would no doubt like to attach their request for proposal to the contract and have it function as the performance criteria. No software package vendor would agree to such an arrangement. Placing personalized demands on a product designed (as all packages are) to offer standard functions would give the vendor no room to perform. Performance measures have to be geared to what the vendor says the unmodified package will do, not what a user would ideally like it to do.

What then is a fair measure of performance? One common example or statement of performance is that the software will function as outlined in the user documentation. A user could also ask to have the contract stipulate the software must pass certain postinstallation performance tests. It might also be wise to define acceptance of the package as occurring on the day performance tests are met.

Another option is to have a fixed trial period serve as the performance measure; when a large-scale system is being installed and tested, however, 30 or 60 days will hardly be ample time.

A key question could change both the vendor's and the user's perspectives in terms of performance warranties: Are you getting the source code? If you don't have the source code, you will be at the mercy of the software vendor if you ever want to make changes, integrate the package with another system, upgrade hardware or just if you come across a bug or lose some object code. Because you will not have the ability to change anything, performance criteria such as warranties will become ever more crucial.

When a user buys software with the source code, the software comes "as is." The vendor's contract is sure to revoke liabilities or warranties because the vendor would be a fool not to do so. By giving a user the source code, the vendor also gives the user the ability to modify the way the software performs. As a result, the vendor will therefore no longer want to sign a contract ensuring that the end result of that operation will meet certain levels. Buying software "as is" has no drawbacks — if you do your homework. That means seeing a demonstration in an actual client environment rather than in a controlled situation like the software vendor's office. Talking to a client actually using the software is the best way to measure software performance regardless of what the software is.

When a package is purchased without the source code, a user should make sure two points have been covered. First, does the contract stipulate how future versions of the software will be installed, how much they will cost and who will pay for them? Does a yearly maintenance or license fee include personnel costs of installation? Don't rely on future enhancements to increase the payback on your software investment. Most follow-up releases deal with solving what was wrong with the earlier version — for example, removing bugs or improving usage — not with expanding operational capabilities presently available. If enhancements are announced, the vendor will offer them under a separate module at a new price — you don't get software for free.

**Never, never pay for everything up front — even for a discount. You'll lose your prime bargaining chip — withholding payment.**

Second, make sure the vendor has placed the source code in escrow and has defined what happens if the vendor goes out of business. Do you get a copy of the source code? Does the holding firm become its owner and therefore your landlord? These are legal questions you must discuss with your lawyer.

**Pricing:** The contract states the price. Just make sure it also matches payments to vendor performance. If you're buying software, receiving the source code and having modifications done, a sample payment schedule might be the following: 50% of the package price when the agreement is signed; 50% of the package price upon installation; and modification charges to be billed to you only after you've signed off on work time sheets and/or reviewed progress in some type of regularly scheduled status meetings. A user buying a package without source code could tie part of the payment to installation and part of the payment to satisfactory completion of performance criteria (for example, postinstallation tests). Never, never pay for everything up front — even for a discount. You'll lose your prime bargaining chip — withholding payment.

The contract should also grant rights to future purchases at premium rates. A normal software package license entitles usage on only one CPU (but usually includes maintaining a backup copy for archival purposes). An organization that can foresee the need for duplicate copies or permission to download/migrate programs in a distributed/local network

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should realize that now's the time to establish the associated costs. Secretly producing such copies could invite a lawsuit from the vendor, and legal costs for copy-infringement defenses usually exceed package costs.

Establish the price for the remaining modules if you are buying one or two modules of an integrated system (for example, the company needs order entry and inventory now; maybe later manufacturing control and purchasing will be necessary).

This agreement might involve a set time frame or series of cutoff dates whereby the follow-up modules are available at a set price or increase at a set percentage that would allow for inflation and enhancements.

Timetable: A word is missing here — *realistic*. It is important that the timetable be realistic for both user and vendor. If you don't already have one, work out an installation action plan with the vendor to ensure a smooth transition from the present system.

Add-ons: The user who buys a software package is getting a lot more than the named entity usually stated in the beginning of the contract. What you're really getting, whether you realize it or not, is a new way of operating a portion of your business. Have you considered all that this entails? Do you want user training? Do you want user manuals in addition to system documentation? Is the cost included or extra?

Most software licenses start out by saying: "This agreement supercedes any previous verbal or written claims." If the organization wants the documentation included in the price of the software, get it in writing in the contract. Most vendors offer training on a billable basis. If you expect free training, get it in the contract. Such contractual dealings take time. Any software procurement timetable should reflect the need for this discussion period right from the outset.

Of course, even a well-written contract can't guarantee results. Some of today's software contracts go so far as to outline a means for settling disagreements that might arise. A prevalent example is arbitration, which allows the user to resolve disagreements while avoiding the excessive delays and costs of taking the vendor to court. Be careful, though. Recent precedents have given arbitrators not bound by stipulations within the agreement a free hand in deciding the outcome.

If disagreements do arise, another alternative is negotiating disputes. For example, assume the software has been installed. Response time is slow. A file won't accept any more records. Operators keep keying in the wrong data because the order form doesn't match the entry screen. Are these problems caused by hardware, or do you have a legitimate gripe about the software vendor's package? Identifying the culprit will require a computer expert. You have two choices: assign a senior programmer/analyst on staff or retain the services of a consulting firm.

If after clearly defining the issues and reviewing pertinent agreements you feel a legitimate claim exists, delineate this claim in a letter, detailing subsequent demands, and mail it to the vendor with copies to appropriate senior management. This action puts you on record (which will be valuable in the eyes of the court) and shows the vendor you're serious.

In the software industry, reputations go a long way in making sales, and most vendors willingly negotiate disputes, especially if the user hammered out a solid contract in the first place. Finally, negotiations should end with an agreement outlining the vendor's actions.

■

*Saczech is marketing manager for Mincron SBC Corp. in New York City.*

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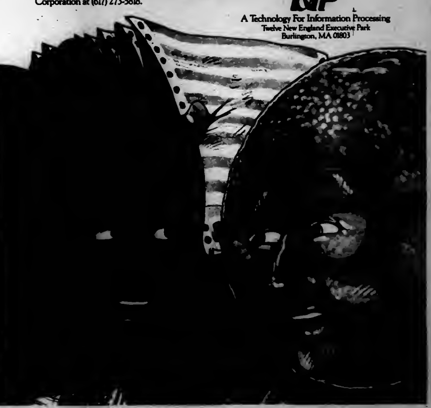

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# Prototyping – New Tools For Cutting Through The Applications Backlog

## By Carol A. Kaniper

Many data processing departments are faced with application backlogs measured in years. And, although users are threatening to hold their collective breath until they turn blue, there seems to be little management information systems managers can do to crank out applications faster.

Application backlogs exist because the complexity of many DP systems has grown beyond human control. MIS managers have to spend too much time pigeonholing application systems into the organization's data base — verifying relationships here, creating new data bases there. As these procedures eat up time, the backlog grows, users get angry and applications — critical to a company's success — become obsolete before they are completed.

These problems are not new. Computer departments have had trouble meeting user demands for applications since the dawn of DP: A number of companies offer products that attempt to relieve the pressure of application system development. Known variously as fourth-generation languages, application generators and/or systems development tools, these products offer ways to streamline application development and better manage data base resources. Some of the systems and their makers include Dbase from Ashton-Tate; Ideal from Applied Data Research, Inc.; Linc II from Burroughs Corp.; Mantis from Cincom Systems, Inc.; SQL from IBM; and Ramis II from Martin Marietta Data Systems, Inc.

One of the most important capabilities these systems provide is application prototyping. Prototyping gets users involved in application development. They get to help engineer their applications, not simply test drive them. A prototype is the forerunner of a live system. It is a working model that gives users a better feel of how the system will work and allows users to determine if the initial design is correct. Among the benefits provided by the prototyping approach to application development are the following:

- **Happier users:** Fourth-generation prototyping involves the end user to higher degree than traditional application development. This increased involvement lets the user make changes to the application system at an earlier point in the process. Prototyping provides the user with a physical model to examine, test, evaluate and comment upon, rather than an intangible stack of specifications. There is a greater chance users will be pleased with the live system

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when it is finally delivered because they have played an important role in developing it.

In his book *Application Prototyping: A Requirements Definition Strategy for the 80s*, Bernard H. Boar describes the benefit of increased user participation in application development. "Users must be actively involved to ensure the functionality and acceptability of the system. In conventional prespecification, users may or may not find reading the documents and attending the walk-throughs exciting. They may sign off after a careful analysis of the proposal or simply sign off to get rid of it.

"Users can't wait to see a prototype. Their eyes light up and the ideas swirl as they experience the imperfect model. The users actively participate because they have a meaningful and comfortable medium to participate through. The problem becomes one of sorting out all the ideas and suggestions for tryout rather than an absence of innovative suggestions," Boar notes.

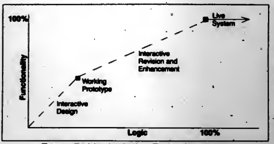

Figure 1. Evolving Applications Through Prototyping

- **Improved DP productivity:** In a 1983 study of six companies using a fourth-generation system, Dr. Eberhard Rudolph of the University of Auckland, New Zealand, found fourth-generation systems can improve programmer/analyst productivity by 1,000% to 2,000%. One main reason for improved productivity is the prototyping capability provided by most fourth-generation systems.
- **Improved business responsiveness:** Prototyping with a fourth-generation system not only improves the productivity of the DP staff, it has a major impact on end-user productivity. Users get tailored solutions more quickly than previously possible, which may allow better use of clerical personnel, cost savings through more timely and accurate information and better decision-making ability.

The ability to produce application systems faster also allows an organization to accommodate new business more quickly, which enhances its market position. In addition, improved productivity may provide a competitive edge in a new business area (such as customer service) or automation of new business growth targets.

- **Reduced development risk:** According to Boar, many large software development projects never result in an operational system or do so only after significant modifications. "Medium- to large-scale application development is a high-risk undertaking. To minimize risk, models must be used to test the ideas. Only when the risk level has been negated by consensus acceptability of the model, are major resources expended to build the full system."
- **Reduced user training time:** It naturally follows that if users are involved in developing their own applications, training time will be significantly reduced. Users know the system because they helped develop it. In addition, once a definitive working prototype is developed, it can be used to train other users.
- **Simplified project management:** Boar points out that as a result of the iterative nature of developing an application through prototyping, it is unnecessary to create a formal control system such as Gantt or Pert diagrams. Because revised prototype systems can be created quickly, usually in a matter of a few weeks, a status report can be an actual demonstration of the revised working prototype.

Developing an application system based on prototyping closely parallels traditional application development in its early stages. In both approaches, a thorough systems analysis is conducted of the user's department and proposed application.

After systems analysis, however, the two approaches diverge. In a traditional development process, the systems analysis team then creates an extensive set of system specifications. The specifications are often an analyst's interpretation of the user's requirements as well as specifications such as how the new application will interact with the company data base — something in which the user has no interest. Yet the user is expected to review and approve the specifications. After the specifications have been approved, one or more programmer/analysts code the application system.

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After the coding, however, changes and revisions become difficult, and user input characteristically is no longer sought. At this point, careful attention must be paid to the entire program structure and its data base. A simple field change in a screen typically ripples throughout the entire program.

By means of the prototype approach, a more compact proposal is drawn up. Little mention is made of the interaction between the user's application and the corporate data base because many fourth-generation systems manage this activity automatically. When the general concepts for the application are agreed upon, the systems analyst or programmer creates a working model of the application (see Figure 1, Page 44).

The prototype or application model is a working framework. Usually in a matter of days or weeks, working screens rather than vast sets of specifications are produced and presented to the user, who is encouraged to make constant comments and updates. Almost any aspect of an application can be prototyped and tested by the user to make sure it meets application requirements. Logic can be tested for transaction processing, reports or batch processing. Though not fully featured with all the required functions and logic, this working prototype allows the user to review the basic application design before the system programs are generated.

As shown in Figure 1, the user and developer interactively revise and enhance the working model as it moves toward full production capability. More and more logic and functions are defined as the model moves closer and closer to the ideal system.

When the user and analyst agree that the model contains all the desired elements, a live system is generated. Some fourth-generation systems using the elements defined by the prototype will generate everything necessary for a live production system, including data communication links, the data base structure and the necessary Cobol programs.

What about the down side? If it's so easy to create application systems using prototyping, won't users request new systems more frequently? Won't users want every available bell and whistle included in their systems? Because programmer/analysts know bugs can always be fixed later, won't preliminary designs get sloppier and sloppier?

Certainly, prototyping is not a cure for bad design habits. A bad driver's driving techniques won't suddenly improve when he gets behind the wheel of a grand prix race car. If a DP department's application development practices are poor before a fourth-generation system is installed, the new system may not help much.

It is possible users will want to add more functions to their applications using the prototyping method than they might using a traditional approach. This is not necessarily bad, especially if the user feels the functions are necessary. If the user comes away with a system that has a few extra features, it won't, in most cases, add significantly to development time; it may help the user do the job and, therefore, probably will result in a happier user. If requests for progressively more functions get out of control, one approach is to point out the added cost and delay for creating each additional feature.

"We don't develop application systems anymore, we evolve them with the user's help," said Morris Ayres, DP manager for Universal Rundle, a plumbing fixture manufacturer in New Castle, Pa. "We work with the user to move the system from a concept to a full-blown system. Users become more comfortable through the evolution process — the process becomes a training ground," he added.

"In most cases, a systems analyst will work in a department and use the old system for a period of time. The analyst documents the old system for review purposes," Ayres explained. "Once we work out the conceptual design, we design new screens, get them to run and that system becomes the basis of development."

Ayres said that before converting to a fourth-generation system, Universal Rundle faced a three-year backlog of application requests. "We tried many different ways of simulating the proposed application. We used overhead projectors and showed users what the screen would look like before and after it changed," Ayres said. "No matter how hard we tried, we always seemed to come up short.

"Now we're getting systems in place faster. We've reduced our backlog to six months," he said. "Management knows it will get its application in place in a reasonable time frame; that's what it expects from us. We experienced a 60% increase in programmer productivity — just a sheer reduction in the number of lines of code we have to generate. We've reinvested the time we've saved on improving the quality of the applications we deliver."

Prototyping is but one aspect of currently available fourth-generation application system generators. Used properly, the prototyping approach to application development can help chop backlogs and give everyone — from DP personnel to top management — a little breathing room.

*Kaniper is program development manager for Burroughs Corp. in Detroit, Mich.*

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# Bringing DSS Into Focus

*Decision support systems are finally coming into their own. The technology is available today and their capabilities are just being discovered. Some organizations are already making DSS a reality.*

## By Stan Kolodziej

Every day, Steve Anderson sits at his terminal at the Atchison, Topeka & Santa Fe Railway Co. offices in Topeka, Kan. He types in his password and logs onto the railroad company's operations expeditor (OX) software system, developed in-house. As Anderson plugs in a set of commands he is soon enmeshed in OX's railroad car tracking subsystem. Very quickly Anderson sees which freight cars are scheduled to be used that day at various locations across the country. He also sees which cars are lying idle and what empty cars are being hauled to other areas.

Typing in a few more commands, Anderson leans back and watches as the computer flashes the effects of moving some freight cars from Clovis, N.M. to Barstow, Calif. The screen indicates the cars would be better used in Topeka. The OX system has just answered Anderson's what-if question and, perhaps, saved thousands of dollars in the bargain.

At Genrad, Inc.; a Waltham, Mass., electronics firm, Donald Sundue, corporate director of management information systems (MIS), looks at the massive monthly operations report sitting beside him. Instead of picking it up, he punches instructions into his terminal. Sundue's screen quickly displays a condensed electronic version of the report, presented by means of the Command Center, a decision support system (DSS) from Pilot Executive Software, Inc. of Boston, Mass. A few more keystrokes and Sundue has gleaned, consolidated and printed what he wanted from the report without flipping through any pages.

Both the above sketches represent real uses of DSS. At the Atchison, Topeka & Santa Fe Railway, the company's OX system has been touted in some circles as the most extensive user-developed computer system in the U.S., if not the world. OX also represents what DSS is supposed to be all about: putting computing power in the hands of users.

Steve Anderson, the railway's senior special assistant to the vice-president of the Information Systems Department, explained that the system was produced over the past decade almost exclusively by non-data processing personnel such as himself. OX was written with the help of the fourth-generation Mapper language and application tools provided by Sperry Corp. of Blue Bell, Pa. The system's grass roots user involvement began when the Atchison, Topeka & Santa Fe's industrial engineering teams were called in to try and improve the manual billing system and failed. A Sperry representative then entered and convinced Anderson that the railway really didn't need a DP department to handle automated billing. He was right. Within a mere four months, Anderson and three other railway employees without computer training had put both a billing system and a piggyback car-loading system in place.

"We've never had to go outside to get [the OX system] done," Anderson said. "We have our own expert systems people right here. The people using the system know the business, and they should be the ones who put it together."

OX is a decision-making tool in a very real sense, but it is not used by those making the most important corporate decisions at the Atchison, Topeka & Santa Fe. This has been a big dilemma for vendors of DSS since they first began appearing more than a decade ago. Aimed at corporate decision makers, today's DSS offerings are still used almost entirely by middle management and, ironically, these people are not corporate America's major decision makers. Executive hands have remained for the most part clean from the touch of computers and computer terminals. When executives do some decision making, they put pen to paper and use intuition, not keyboards and spreadsheets.

With executives looking the other way, DSS were quickly assimilated into corporate data centers, where programmers used them to pump financial data to financial analysts, accountants and other middle managers. These people, in turn, have since used DSS to produce the finished reports executives read and use as a base for some of their decision making.

"DSS has had trouble reaching executives because those who rise to the top of corporations also seem to rise above the data," explained Paul Cubbage, senior industry analyst at Dataquest, Inc., a San Jose, Calif. consulting firm. "Most of the time they don't even use data to solve problems."

The DSS concept got its start early with financial applications and has deviated little from this financial touchstone. Early mainframe-based DSS products such as Interactive Financial Planning System (IFPS) from Execucom Systems Corp., Austin, Texas; Focus from Information Builders, Inc., N.Y.; and System W from Comshare, Inc., Ann Arbor, Mich., were the inspiration for a number of large, financially driven DSS products that, until the arrival of the IBM Personal Computer, had a stranglehold on the DSS concept. Financial DSS programs are extremely data-driven and their supporters look askance at some of the more intuitive, abstract input to many decision-making programs now on the market for personal computers.

The IBM Personal Computer has had a twofold effect on DSS. First, it has done much to take DSS out of the old grasp of the DP department and into the lap of the user. Almost every DSS vendor now offers a micro version of its mainframe DSS product. Second, by downloading data from the mainframe onto a microcomputer and merging the data with programs such as Lotus Development Corp.'s 1-2-3, the user can create more open-ended, personalized DSS applications than is possible when tied to a mainframe.

An example can be found at the F.W. Woolworth Co. in New York, where the retailer's MIS department is working with users in its information center to migrate mainframe IFPS applications to IBM PCs. Using Execucom's Dataspan conversion software, programs written in Cobol and other non-Execucom languages can be converted to IFPS format without the use of programmers. Barry Putt, F.W. Woolworth's manager of corporate business applications, said divisional managers are using IBM PCs to create personal financial modeling projects using such cryptic tools as variance analysis, return on investment trees and profit center scenarios.

"IFPS command structure is easy enough to lead our people through any models they want to develop," Putt explained, adding that he welcomes the ease of transferring IFPS to a PC environment because he and his MIS colleagues are busy with other perhaps more important corporate work.

Putt's praise of the IFPS command structure is important, for the command structure is the way the DSS product and user communicate. "Overall, DSS has been uninteresting because of the interface problems," said office automation consultant Amy Wohl, president of Advanced Office Concepts Corp., Bala Cynwyd, Pa. "Most systems still require users to be experts. Artificial intelligence has been making ground, but not enough in improving the interface to DSS."

One of the bright spots Wohl mentioned, however, is Metaphor, from Metaphor Computer Systems, Inc. in Mountain View, Calif. Metaphor is an information retrieval and analysis system that is far from PC-oriented, costing between $8,000 and $10,000 per user. It employs the company's own workstations, shared file servers, data base servers and mainframe communications servers — all tied to a Xerox Corp. Ethernet local-area network. David Liddle, Metaphor's chief executive officer, said the ideal user of Metaphor would be a large company that requires "a lot of data and a lot of ad hoc decision making."

The Metaphor application capsules allow users to take the symbolic icons through windows on the workstation screen and to create their own DSS applications. Applications are not written in the traditional sense, and no code is used. Instead, applications are made by interconnecting the icons by arrows, linking each command in a long chain. Liddle said more than 90% of all Metaphor user applications (mainly financial querying

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**Figure 1. Sampling of Decision Support Systems**

and reporting) are produced this way by the actual users.

The often complicated command structure of most DSS products has been another stumbling block in getting executives to use the systems. Even the physical interface itself can cause resistance. "Executives have a psychological barrier about keyboards. Executives do not type," said David Friend, president of Pilot Executive Software, Inc., which is the producer of Command Center. Taking this observation into account, Friend has made sure the basic interface for Command Center is the electrical device called a mouse. Most other companies offering DSS systems are also starting to offer a mouse interface.

Many data bases used in DSS products are written in third-generation languages such as PL/I and C. The command interfaces between these data bases and the user are now being written in fourth-generation languages, however, which is a boon to users. These fourth-generation languages stress English-like commands and less emphasis on rigid procedures for users. With a more natural interface, DSS — especially those that run on micros — promise to gradually pry themselves from the traditional middle management base while offloading much of the DSS burden currently carried by MIS.

Texas Instruments, Inc. in Dallas, Texas, for instance, has been using Information Builder's Focus, a popular DSS fourth-generation language, to build personal DSS applications on a large part of the company's massive network of 14,000 personal computers. According to Bart Benne, Texas Instruments' manager of end-user computing, users can range from lab technicians and engineers to white-collar administrative staff. "Ninety percent of all applications on the data base query side are written by the users themselves, " Benne explained. "In the past, programmers would often have been too busy to do the job for them." Benne added that Focus training and programming seminars at information centers scattered throughout Texas Instruments operations has offloaded much of the overtime MIS processing work.

To be sure, the micro has spawned a whole new generation of smaller financial DSS products such as Easyplanner and Supercalc, both from Computer Associates Sorcim/IUS, San Jose, Calif.; DSS Workbench from Lloyd Bush Software Products, Inc., New York, N.Y.; and Esca-DSS from Esca, Inc., Chicago, Ill. However, the much lower costs and personalized touches associated with microcomputers have allowed new vendors of DSS products to explore niche areas and vertical markets with products based at least in part on abstractions founded on mathematics, psychology and intuition. Although many might lack the cachet of financial data, what they lack in business gravity, they compensate for in fun.

One of the oldest of these new open-ended DSS products is Expert Choice, which finds its inspiration in the analytical hierarchy process (AHP), a set of equations taken from the recesses of university research. Expert Choice uses an inverted tree-like "configuration analysis" procedure that measures pairs of options on the way to a predetermined goal.

According to Mary Ann Selley, president of Decision Support Software, Inc., the McLean, Va. producer of Expert Choice, "Expert Choice uses matrix arithmetic based on icons to lead the user to make gut decisions from a combination of qualitative and quantitative data. It's arriving at a strategy, and strategy is more than just juggling financial spreadsheets." Others seem to agree. Selley pointed out that current users of Expert Choice include bankers determining which countries to invest in, oil companies trying to find the best way of getting more dollars out of old oil wells, and U.S. Department of Defense officials who use the package to conduct nuclear attack, first-strike scenarios.

Other such DSS packages are increasingly becoming part of a melting pot classification known as "mindware." Maxthink from Maxthink, Inc., Piedmont, Calif.; Lightyear from Lightyear, Inc., Santa Clara, Calif.; and Trigger from Thoughtware, Inc., Miami, Fla., are examples of DSS mindware packages trying to ease themselves into business psyches — and pocketbooks.

Lightyear's chairman, Terry Garnett, described Lightyear as "a framework for organizing, analyzing and evaluating different alternatives." Thoughtware recently issued a letter of intent to purchase Lightyear, Inc. Jack Levine, president of Thoughtware, classified Trigger as a product "that automatically triggers actions based on exceptions to established guidelines" while hopefully increasing profit for corporate users. These products are targeted toward the business market, but their vendors would argue decision support is only as limited as the imagination of those using the packages. Trigger, for example, is being used by a police department to monitor the efficiency of squads supervised by a police lieutenant.

The future of DSS is tied to fourth-generation languages and the ability to make the communication between user and system as natural and easy as possible. David Tory, senior vice-president of planning at Computer Associates, Inc., the Jericho, N.Y. producers of CA-Financial Planner, a mainframe-based DSS, offered an explanation: "The whole orientation of DSS is toward languages users understand. DSS people are finally beginning to use the tools to make software a function of the computing environment, not the computer system itself."

*Kolodziej is a senior writer at* Computerworld Focus.

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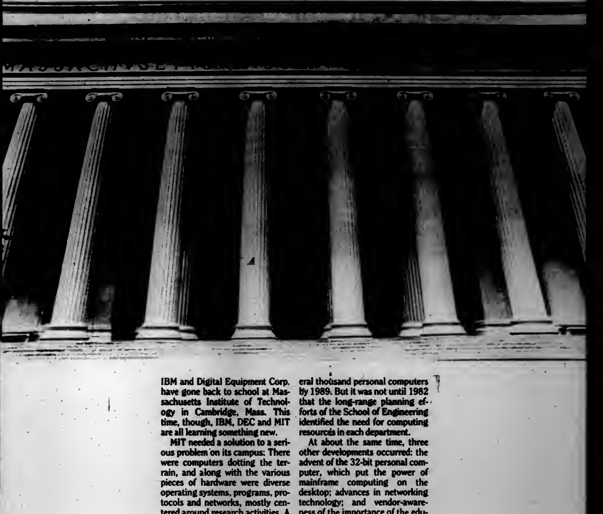
# MIT's Project Athena: A Meeting of the Minds

## By Lee White



IBM and Digital Equipment Corp. have gone back to school at Massachusetts Institute of Technology in Cambridge, Mass. This time, though, IBM, DEC and MIT are all learning something new.

MIT needed a solution to a serious problem on its campus: There were computers dotting the terrain, and along with the various pieces of hardware were diverse operating systems, programs, protocols and networks, mostly centered around research activities. A student moving from one computational environment to another, even within the same department, met time and programming barriers that seemed hardly worth the effort to overcome.

As far back as 1979 The MIT Ad Hoc Committee on Future Computational Needs and Resources recommended networking the entire campus and distributing several thousand personal computers by 1989. But it was not until 1982 that the long-range planning efforts of the School of Engineering identified the need for computing resources in each department.

At about the same time, three other developments occurred: the advent of the 32-bit personal computer, which put the power of mainframe computing on the desktop; advances in networking technology; and vendor-awareness of the importance of the educational market.

Professors in the School of Engineering began discussions with major computer manufacturers in late 1982. As negotiations progressed, MIT decided that more than one vendor's participation would ideally simulate the true multivendor environment. In May of 1983, MIT signed a $70-million agreement with Digital Equipment

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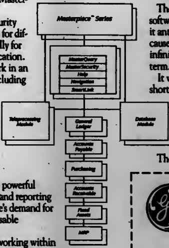

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Corp. and IBM, and Project Athena was born.

Project Athena, named for the Greek goddess of wisdom, differed in many ways from outwardly similar agreements inked by computer manufacturers and universities. For the most part, other pacts involved vendors' donating equipment to educational institutions with the hope that students would become accustomed to particular hardware during their campus days. Those students would influence the purchase of the same equipment after they graduated and entered the work force, vendors gambled.

Project Athena was the first time two big players signed on together for a long-term, side-by-side venture that involved much more than donating hardware. This venture meant the physical presence in adjoining work spaces of IBM and DEC engineers for three years and five years, respectively.

Steven R. Lerman, professor of civil engineering and director of Project Athena, was quick to point out that, although the five DEC and five IBM people talk to each other and have adjacent offices, the relationship between IBM and DEC exists only in the context of a shared relationship with MIT. "In many cases they are working on projects toward common ends — MIT's common ends — but there is no contractual relationship between IBM and DEC, none at all," Lerman explained, adding that their contractual relationship has fairly comparable conditions.

Lerman did, however, comment that each corporation just might have something to gain. "Athena matches some corporate end, but that end is very, very abstract."

For MIT, the end was not at all abstract. Making sense out of the impossible-to-quantify numbers of computers from myriad vendors, most operating in little more than a vacuum, was just one goal. Faculty members who served on the initial task force for Athena were also looking for new ways to teach. The educational environment of the '80s really differed very little from that of 100 years before: Students learned by listening to teachers' presentations of new concepts; by reading books and journals; by working problems and receiving feedback; and by observation, trial and error in the laboratory.

**Project Athena was the first time two big players signed on together for a long-term, side-by-side venture that involved much more than donating hardware. IBM and DEC engineers share adjoining work spaces for three years and five years, respectively.**

MIT's primary goal, then, was to devise imaginative ways to use computers to enhance and perhaps revolutionize the learning experience. Of the $70 million cost estimate for Project Athena, $25 million each would come from DEC and IBM and $20 million was to be raised by MIT. Most of that $20 million was earmarked for curriculum innovation and design. This money would allow faculty members time to work intensively on their projects. To date, $12.5 million has been raised. At a point less than halfway through the five-year program, more than 70 projects have been funded.

Although a preponderance of the courses deal with various engineering disciplines, a surprising number have originated within the schools of architecture and humanities, with a great deal of input from the Sloan School of Management.

According to Lerman, most of the interesting uses of computers in higher education do not involve using computers as substitute teachers or even as part of direct classroom teaching. Lerman explained that at MIT the average student spends only 12 to 15 hours each week in the classroom, but labors 40 additional hours outside the classroom reading, working in the library, writing papers and working in the laboratory.

As an example of how computers serve as an out-of-classroom aid, Lerman cited a professor who teaches a course in quantitative physiology. Part of the coursework involves teaching mathematical models of the heart-lung system; particular variables include heart rate, pressure in the aorta and oxygen transport across the artery. A standard mathematical model that is traditionally used produces six coupled differential equations. Most students understand the equations at some level but, because the equations are tightly interlinked, have no intuition of how the system really works.

"What the professor has done," Lerman explained, "is to build a software package with graphics. Students can exercise the model system and experiment to see what happens if a drug is administered that decreases the venal pressure or what happens if a drug accelerates the heart beat. They're actually performing 'what-if' experiments on this complicated mathematical formulation. We hope this method will help them develop intuition."

That professors in one of the most distinguished universities in the world could formulate novel methods for educational computing is not surprising. The more complex part of the project, creating a common environment so that these new educational methods are available to the entire MIT community, was something for which MIT sought outside help. In Athena's original planning phase, specifications were written for a long-term environment based upon networked high-performance advanced workstations with graphics capabilities. At the time, neither IBM nor DEC had built such a device, and it was decided that Phase 1 would revolve around existing hardware to build approximations of the future environment.

Unfortunately, asynchronization has been the order of the day for the hardware side of the project. DEC has announced and is shipping its Microvax II and, with a high-end display, the Microvax II matches MIT's specifications. IBM, on the other hand, has not announced an appropriate advanced workstation. Phase 1 has therefore consisted of lightly loaded VAX machines on the DEC side. The IBM side, after a number of design changes, uses Personal Computer ATs and XTs on a network with a uniform software environment and graphics displays. At present, the equipment includes about 53 VAX units, 160 PC ATs and a few Microvaxes for experimentation.

The single integrated network that ties the hardware together serves about seven or eight local-area networks. This network is two-tiered, with local Ethernets and a backbone network that links them together with a gateway between. The gateway, which is transparent to the user, operates with a single protocol.

With incompatibility looming large in the industry, MIT may well be blazing new trails for the coherence it hopes to attain. Lerman called this coherence "a fairly grandiose objective," admitting that MIT will not necessarily be able to drive the industry. "Neither IBM nor DEC nor any other manufacturer is obligated to follow the way we're headed, but we hope to demonstrate the value of that sort of environment," he said. If the project is as successful as the Athena committee expects, the results will demonstrate that hardware from different vendors can be integrated in a manner that exploits the relative advantages of

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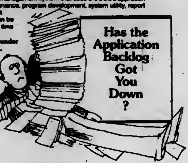
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> **"We're talking about a university environment that is heavily oriented toward people and activities that are research-, teaching- or learning-oriented. To the extent these attributes can be generalized, then they can be transferred to other environments."**
>
> *Robert V. Mazza, IBM*

The heart of Project Athena, however, is not hardware but software. The two workstations presently run different software operating systems: the VAX machines run Berkeley Unix and the PC ATs (and XTs) run PC-DOS 3.0. The data communications protocols are written so that files can be moved freely between the two systems. Nevertheless, the team is headed toward a higher plane of compatibility. "We have prototype software that allows a VAX to provide disk space to a PC AT or PC XT. The PC issues an order to spin up the disk over the network. The VAX is hooked to the same network, and it recognizes the name of the person using the disk and accepts a password access. In effect, you have another PC disk, an E disk. You have the total illusion of having another hard disk, except that it really exists over the network and the VAX is providing it," Lerman explained.

DEC seems to be running ahead of IBM at this time, with its workstations and software actually driving the project, but Lerman hopes that gap will narrow soon.

At the beginning, DEC had its VAX units running Berkeley Unix, but lacked a high-performance workstation. IBM, with its PC AT, had a reasonable workstation, but could not run Berkeley Unix. In Phase 2, when common features of workstations will include a 32-bit processor, a high-resolution bit-mapped display and a local-area network, the theory is that both these problems will be resolved. Much of the uncertainty that exists now is due to IBM's slowness in coming up with a product.

Lerman would not comment officially on IBM's plans for an advanced workstation running Unix, stating instead that discussions are ongoing. He also said the Athena group and IBM were talking about the possibility of experimenting with an unannounced product. "The discussions are quite clear and moving in a certain direction. Part of the [antitrust agreement] issues were that [IBM] was restricted to only announcing things to which they were committed absolutely. So they're very conservative," Lerman said.

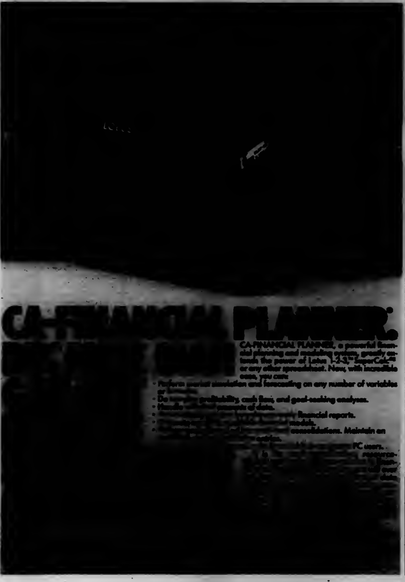
With $50 million riding on the project, IBM and DEC might be suspected of having underlying motives that go beyond sheer altruism and the quest for new ways to learn. Jack McCready, manager of External Research Programs for DEC, explained in the best corporate manner that DEC has a long-standing tradition of interaction with universities; he cited approximately 200 DEC-sponsored projects at more than 75 universities in recent years. McCready admitted, however, that Project Athena is certainly the largest project DEC has sponsored, and a first for its coinvolvement with IBM.

McCready's background lends itself well to his job. Prior to joining DEC in September 1984, he spent five years as president of Educom, a nonprofit consortium of 500 universities dedicated to looking at how colleges and universities use computing.

Before Educom, he was vice-provost for computing at Carnegie-Mellon University in Pittsburgh. While at Carnegie-Mellon in 1976, he negotiated a large three-year pact with DEC.

McCready stated that DEC has the best program of university involvement in the industry. "It's a long-standing commitment going back many years and a general success story in that we believe that working with research organizations in higher education is an excellent way to learn about computer information processing-related technology." Regarding Athena in particular, McCready stated that he thought the project could give birth to a new model of computing that might very well take over entire education and commercial accounts over the next few years.

This commercial applicability of Project Athena was not lost on McCready.



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Although predicting potential marketability of basic research is difficult, the educational community itself is a huge customer base for DEC, he explained, and accounts for several hundred million dollars each year. This dollar figure will increase as the price of the technology drops and the individual student and faculty workstation becomes a viable alternative to center-based computing.

> **"We will be able to learn a tremendous amount about the use of our products in a very large networking case, not hundreds of machines but thousands of machines. That has a direct commercial spinoff for us."**
>
> *Jack McCready, Digital Equipment Corp.*

In addition, DEC sees itself as a networking company, and networking is what Project Athena is all about. "[Athena] is probably going to be one of the biggest experimental utilisations. We will be able to learn a tremendous amount about the use of our products in a very large networking case, not hundreds of machines but thousands of machines. That has a direct commercial spinoff for us," McCready said.

Whether this spinoff is in the back of IBM's mind is a subject Robert V. Massa, director of development for Academic Information Systems at IBM was less inclined to discuss. "Clearly, we're talking about a university environment that is heavily oriented toward people and activities that are research-, teaching- or learning-oriented. To the extent these attributes can be generalized, then they can be transferred to other environments."

But Massa expressed doubt that much would be gleaned from Athena that would be relevant outside the groves of academe. He characterized the IBM/DEC activity at MIT as a system interconnect and programming architecture and a user and application interface defined by that environment. "It isn't as though we're bringing in our architectures, nor is DEC bringing in its architectures," explained Massa. He added that he didn't think the goals of Project Athena had anything to do with evolving communications, programs or applications interface standards. If such standards were a byproduct of Athena, Massa concluded, "it would be highly surprising to me and would certainly be an unexpected benefit."

IBM's view notwithstanding, perhaps the most important result will be that of the DEC/IBM connectivity. When Number One and Number Two join forces, the potential market value of the results could be staggering. "We see environments out there where DEC and IBM systems have got to work together smoothly and that is the whole notion of coherence at MIT. IBM systems and DEC systems, networks of them, lots of them all working in a common environment," understated DEC's McCready.

Although present installations including both DEC and IBM systems stand to reap great benefits from a coherent technological breakthrough, the question of further narrowing the hardware vendor field would seem to be more probability than possibility. McCready insisted that the open environment of Athena would have broadening rather than narrowing results, but one would expect that IBM and DEC will have a substantial head start on commercial applications.

MIT's Lerman explained that any and all results of the Athena project will be owned solely by the university and they will be disseminated free of charge to other universities.

However, IBM and DEC don't have to worry about being left out in the cold. "The principle we're working on, although it's not embedded in contractual language, is what I would call the most-favored-nation principle. We will not make deals with third parties other than DEC or IBM that are better than we would make with DEC and IBM. We would like to create it at MIT and then convince [IBM and DEC] to build it as products. We're not in the support or the maintenance business; that really should be the realm of computer vendors and software houses. Our hope is that they come to us and say, 'Gee, that worked very well and we want to license all this stuff from you and build it.' "

*White is a senior writer at* Computerworld Focus.

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# Products

WESTBORO, Mass. — **Data General Corp.** has introduced two products designed to strengthen the company's networking offerings.

According to DG, the intelligent broadband controller (IBC) enables the company's Eclipse MV/ Family of computers to be connected with Net/One broadband local-area networks from Ungermann-Bass, Inc., Santa Clara, Calif. DG said the IBC is an IEEE 802.3 standard network interface designed to perform protocol handling and other communications tasks to reduce central processing overhead and improve system performance. The single 15-in. board includes 256K bytes of random-access memory, a Microeclipse processor, a data channel interface and a serial I/O section.

DG also introduced the CEO Document Exchange Architecture (DXA), the company's interface with the IBM Document Interchange Architecture (DIA) and Document Content Architecture (DCA). The company said it is implementing the interface to DIA/DCA in phases. The initial phase lets users send and receive mail through an IBM distributed office support system (Disoss) network while appearing to the network as a Displaywriter-like node. The second phase will allow the Eclipse MV/ Family system to emulate an IBM System/36 node.

The IBC is priced at $6,500. The CEO DXA software is priced from $1,500 to $6,500 depending on the type of Eclipse MV/Family system used.

For further information, contact Data General Corp., Information Systems Division, 4400 Computer Drive, Westboro, Mass. 01581.

CHICAGO — ARX, a software product that allows personal computer users to back up and restore disk files to the mainframe, was recently announced by **Chicago-Soft, Ltd.** ARX communicates through CICS (OS/DOS), VM/CMS or TSO. Operation can be in attended or unattended mode. A standard job may be set up on the personal computer to back up files regularly at off-peak hours reducing transmission times and leveling the system load. Directory management and reporting facilities are also provided, the vendor said.

Several techniques for data compression reduce the amount of transmitted and stored data, according to the vendor. In addition, data encryption techniques may be employed and private or public directories may be created to allow the sharing of program or data files.

The cost of ARX varies depending upon the mainframe operating system. For DOS/VSE, the price is $5,000 for five personal computers plus $1,000 for each additional 10; for VM/CMS, $10,000 for 10 personal computers plus $1,000 for each additional 10; and for MVS, $15,000 for 15 personal computers plus $1,000 for each additional 10. For more information, contact Chicago-Soft, 738 N. LaSalle St., Suite 2, Chicago, Ill. 60610.

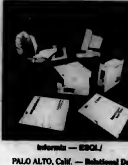
LAFAYETTE, Calif. — **Theos Software Corp.** has introduced Theos, a multiuser operating system for Intel Corp.'s 80286 microprocessor.

Theos, an acronym for The Operating System, has four components: The system administrator, which handles user accounting and system security; the resource manager, which takes and prioritizes requests from the system administrator; the development workshop, which provides for software development; and the application grid, an application interface with operating system programs.

The company said the Theos system offers a help function and is complemented by the Basic, C, Macro Assembler and Executive Job Control programming languages.

The Theos operating system sells for $895, and for $1,295 bundled with Basic. The Theos development package sells for $1,695 and comes bundled with the operating system and the Basic, C and Macro Assembler languages.

Theos is at Suite 100, 201 Lafayette Circle, Lafayette, Calif. 94549.



**Informix — ESQL/**

PALO ALTO, Calif. — **Relational Database Systems, Inc.** has announced Informix—ESQL/, a product based on IBM's structured query language (SQL).

According to the company, Informix-ESQL/C is designed for use by applications developers who program in the C language. The company said the product enables users to embed dynamic and fixed SQL queries within their C programs, and reduce application time.

The price of Informix-ESQL/C running on PC-DOS or MS-DOS machines is $595. A Xenix version is also available for $749.

More information is available from Relational Database Systems, Suite 600,2471 E. Bayshore Road, Palo Alto, Calif. 94303.

PRINCETON, N.J. — **Martin Marietta Data Systems, Inc.** has introduced three products, Smartedit, PC/Reporter and Cobol/XE.

Smartedit is described by the company as an intelligent editor designed for the development and maintenance of programs written in Ramis II, Martin Marietta's fourth-generation language.

PC/Reporter is a PC-DOS version of the Ramis II language reporter. According to the company, PC/Reporter enables users with any sequential or comma-delimited Ascii files to generate customized reports using Ramis II's English-like syntax.

Cobol/XE is a Cobol-based customer information control system (CICS) application development system that supports Cobol programming in the CICS/VS, VM/CMS and VM/PC environments.

Prices for Smartedit range from $2,250 to $4,500. PC/Reporter lists for $795. Cobol/XE is priced at $15,000 for the VM/CMS version, $24,000 for the disk operating system (DOS) CICS version and $33,000 for the operating system (OS) CICS version.

For further information, contact Martin Marietta Telesales, P.O. Box 2392, Princeton, N.J. 08540.

SAN JOSE, Calif. — **Computer Associates Sorcim/IUS, Inc.** has announced Easyplus 1.1, a window manager, and the Easyplus Network Manager, a product that allows users to run windows on a network.

According to the company, Easyplus 1.1 integrates Computer Associates' Easybusiness Systems Plus series of accounting, word processing, data management and financial modeling packages, as well as other popular software packages such as Lotus Development Corp.'s 1-2-3 and Micropro International Corp.'s Wordstar.

The Easyplus Network Manager is designed, the company said, to give all the Plus Series programs operating under Easyplus full local-area network capabilities, providing data integrity.

Easyplus 1.1 sells for $149. The Easyplus Network Manager is priced at $395 each for units of four and $595 for units of eight.

More information is available from Computer Associates Sorcim/IUS, Inc., 2195 Fortune Drive, San Jose, Calif. 95131.

**DEC AI Vaxstation**

HUDSON, Mass. — **Digital Equipment Corp.** has introduced the AI Vaxstation, a workstation which the company said is the first to use artificial intelligence fully. According to the company, the AI Vaxstation combines the performance of the DEC Microvax II computer system with multitasking, multiwindowing and high-resolution graphics. The company added that the workstation's functions are integrated into DEC's VAX Lisp artificial intelligence programming environment.

Priced at $48,690, the AI Vaxstation has a 5M-byte Microvax II processor, a 71M-byte Winchester disk drive, a 95M-byte tape subsystem and a Decnet/Ethernet local-area network interface.

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# Products

three services for broadband networks; Physical design consulting, physical installation management and ongoing maintenance. The company said the services will support customers' broadband networks as well as Digital's broadband Ethernet products.

Costs for the services start at $1,000 per diem. More information is available from DEC, Maynard, Mass. 01754.

IRVINE, Calif. — **AST Research, Inc.** has announced Knight Data Security Manager, a software package the company said is designed to ensure data security, simplify the DOS command structure and add time management and messaging capabilities to microcomputers using hard disks.

**Knight Data Security Manager**

Running on the IBM XT, IBM AT and IBM compatibles, the Knight software employs user-defined passwords to protect data files and application programs. According to the company, the Knight program ensures data privacy by building "walls" around personal files and project areas, instead of using an encryption procedure.

The Knight Data Security Manager is priced at $295. For more information, contact AST Research, Inc., 2121 Alton Ave., Irvine, Calif. 92714.

BLUE BELL, Pa. — **Sperry Corp.** has introduced its Knowledge System workstation, the first of a planned Sperry product line of artificial intelligence/expert systems.

The Knowledge System is based on Explorer, a 32-bit workstation developed at MIT, Cambridge, Mass., under the auspices of Texas Instruments, Inc., Dallas, Texas. The Knowledge System will be marketed with Knowledge Engineering Environment (KEE) software, developed by Intellicorp, Menlo Park, Calif. Sperry said KEE enables rapid prototyping which gives an expert the ability to see quickly, with the aid of diagrams, the value of a knowledge-based system.

According to Sperry, The Knowledge System workstation can address up to 128M bytes of virtual memory, and contains a Texas Instruments high-speed processor designed to run Lisp, an artificial intelligence programming language.

The Knowledge System workstation is priced at $50,000. Copies of the KEE software systems are $60,000 each.

More information is available from Sperry, Information Systems Group, P.O. Box 500, Blue Bell, Pa. 19424.

FORT LEE, N.J. — **On-Line Software International, Inc.** has introduced Verify, a testing control system for IBM customer information control system (CICS) application programs. The company said that Verify's regression testing ensures that an application package will function properly in production.

Among Verify's other features listed were automatic testing which, according to the company, eliminates the need of repetitive operator input, and automatic logical verification, which eliminates the need to visually compare application screens and files.

Verify runs under the IBM DOS/VSE operating system or any operating system with CICS Release 1.5, or greater. It is priced at $25,000 for the DOS license and $35,000 for the OS license.

More information is available from On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

CAMBRIDGE, Mass. — **Index Technology Corp.** has introduced version 1.5 of its Excelerator software for systems analysts working with IBM Personal Computers. According to the company, version 1.5 offers graphics support for additional structured programming techniques, project data-sharing tools for controlling large projects with multiple Excelerator users, and expanded cross-referencing and analysis tools.

**Excelerator Version 1.5**

Excelerator version 1.5 is priced at $8,400 for single quantities, $7,900 each for quantities up to five and $7,400 each for quantities up to ten.

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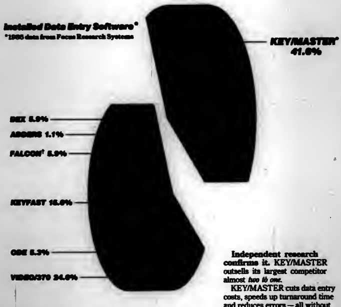

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# Products

More information is available from Index Technology, Five Cambridge Center, Cambridge, Mass. 02142.

WOBURN, Mass. — **Systems Designers Software, Inc.** has announced Envisage, an expert system environmental shell which the company said enables a systems designer to create a variety of applications using such artificial intelligence techniques as traditional logic, Bayesian Inference and "fuzzy logic."

According to the company, Envisage frees the systems designer from "reinventing the wheel" each time a new expert system is developed, using subroutines and inherent techniques to allow the creation of a system specified by end-users.

Envisage runs on Digital Equipment Corp. VAX computers and is priced at $20,000. More information is available from Systems Designers Software, Suite 407, 444 Washington St., Woburn, Mass. 01801.

PROVIDENCE, R.I. — **Cadre Technologies, Inc.** has announced Teamwork/SA, a series of software development tools designed to enable a project team to capture systems requirements, organize them into models and maintain them in an integrated environment.

According to the company, Teamwork/SA is based on an Apollo Computer Corp. DN300 workstation, Apollo's Domain distributed network architecture, and Cadre's proprietary software. Among Teamwork/SA features that Cadre mentioned are a project library which serves as a central data base for everyone working on a specific project, an editing system with mouse interface and a model configuration management function which allows data flow diagrams to be collected into leveled sets.

Teamwork/SA

The single version Teamwork/SA system is priced at $34,900, and the software-only price for a single-user version is $9,800. The multiuser Teamwork/SA system is $41,900 per network node, and the multiuser software price is $17,500.

More information is available from Cadre Technologies, 222 Richmond St., Providence, R.I. 02903.

PRINCETON, N.J. — **ITSoftware**, a division of Martin Marietta Data Systems, Inc., has announced Runit, a disk operating system (DOS) shell program, and Mailit, a document conversion and transfer program.

According to the company, Runit provides a uniform interface to all IBM Personal Computer routines and simplifies program selection, use of DOS utilities, and mainframe log on. The program runs on the IBM PC, the IBM XT, the IBM AT and IBM compatible computers.

Mailit runs with IBM's Script and professional office system (Profs) word processing environments. The company said Mailit works with documents prepared with an IBM PC-based word processor, transferring the documents from Ascii format into the Profs and Script text formats.

Runit and Mailit are respectively priced at $100 and $300. For more information, contact Martin Marietta Data Systems, P.O. Box 2392, Princeton, N.J. 08540.

JERICHO, N.Y. — **Computer Associates International, Inc.** has announced CA-Unicenter, a software-based system for the management of corporate data centers using IBM and IBM-compatible mainframe computers. CA-Unicenter has three components: Data center management software for increasing programmer and operational efficiency; CA-Uniservice, a microcomputer and mainframe-based client service, support and training system; and CA-Activator, an on-line system for automating product installation and maintenance.

The CA-Unicenter is priced at $144,000 for a three-year lease. The company said a perpetual license is also available for $180,000.

For further information, contact Computer Associates International, 125 Jericho Turnpike, Jericho, N.Y. 11753.

FARMINGDALE, N.Y. — **Iskra Software International, Inc.**, a division of Iskra Electronics, Inc., has introduced Formatix, an applications generator for Digital Equipment Corp. VAX and PDP-11 computers.

The company said that Formatix can develop an application for immediate review, enabling the user to chain programs to produce applications. The company added that by using Formatix's menu function, programs generated by Formatix as well as those programs written in Cobol, Pascal or any other language, can be combined.

Formatix prices range from $1,700 for the DEC Microvax to $9,800 for the DEC VAX-11/782 computer.

More information is available from Iskra Software International, 222 Sherwood Ave., Farmingdale, N.Y. 11735.

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September 5-7, San Francisco — **3rd PC Faire.** Contact: Computer Faire, Inc., 181 Wells Ave., Newton, Mass. 02159.

September 16-20, San Diego — **1985 TCA Annual Conference.** Contact: TCA Conference, 1515 W. Cameron, B-140, West Covina, Calif. 91790.

September 17-19, Dallas — **1985 Software/Expo.** Contact: Pemco News Bureau, Suite 205, 2400 E. Devon Ave., Des Plaines, Ill. 60018.

September 18-20, Denver — **Data Base: A Manager's Guide.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

September 23-24, Cambridge, Mass. — **Decision Support and Expert Systems: A Developer's Perspective.** Contact: Decision Support Technology, 51 Church St., Boston, Mass. 02116.

September 23-24, Washington, D.C. — **PC LAN Versus Multiuser Systems.** Also, September 26-27, San Francisco. Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55425.

September 30-October 2, Dallas — **Optimizing Software Productivity and Quality.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

September 30-October 3, Washington, D.C. — **The 5th Annual Conference on Control, Audit and Security of IBM Systems.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

October 1-3, Austin, Texas — **Access '85.** Contact: Access '85, 11754 Jollyville Road, Austin, Texas 78759.

October 1-3, New York — **Understanding Modern PBX Systems.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

October 8-9, Tempe, Ariz. — **Controlling Computer Access in "User Friendly" Environments.** Contact: Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, Ariz. 85287.

October 9-10, Palo Alto, Calif. — **Local Area Networks.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521

October 15-17, Washington, D.C. — **The Micro-Mainframe Connection.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

October 16-17, Los Angeles — **The Yates 2nd Annual Unix Market Forum.** Contact: Yates Ventures, Suite 201, 3350 W. Bayshore Road, Palo Alto, Calif. 94303.

October 15-16, Tempe, Ariz. — **Modern Techniques for Developing and Maintaining Computer Software.** Contact: Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, Ariz. 85287.

October 17-18, Tempe, Ariz. — **Software Quality Assurance: An Investment in Product Integrity.** Contact: Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, Ariz. 85287.

October 21-23, Boston — **Hammer Forum 85.** Contact: Hammer & Co., Inc., 5 Cambridge Center, Cambridge, Mass. 02142.

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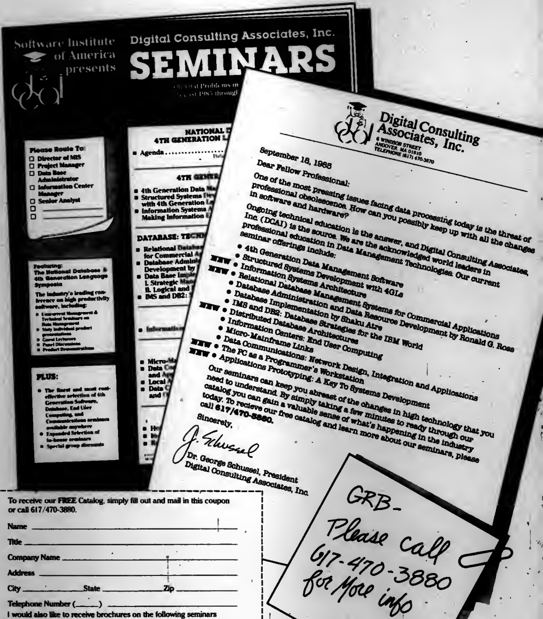

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